INDEXED SYSTEM OF VETERINARY TREATMENT

W. SCOTT

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AN INDEXED SYSTEM OF VETERINARY TREATMENT

“ In the division of life there is time present, past, and to come.

“ What we do is short; what we shall do is doubtful; but what we have done is certain, and out of the power of fortune.

“ If we do not watch we lose our opportunities; if we do not make haste we are left behind, our best hours escape us.”

SENECA.

AN INDEXED SYSTEM
OF
VETERINARY TREATMENT

A WORK ON MODERN MEDICAL, SURGICAL, AND BIOLOGICAL THERAPY

BY

WILLIAM SCOTT, F.R.C.V.S.
FELLOW OF THE ROYAL SOCIETY OF MEDICINE;
FELLOW OF THE ROYAL MICROSCOPICAL SOCIETY;
AUTHOR OF "CLINICAL BACTERIOLOGY AND VACCINE THERAPY"

WITH THE COLLABORATION OF VARIOUS WRITERS

LONDON
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Gift

To

THE RIGHT HONOURABLE SIR CLIFFORD ALLBUTT,
P.C., K.C.B., LL.D., D.C.L., M.D., F.R.S.
REGIUS PROFESSOR OF PHYSIC, CAMBRIDGE UNIVERSITY.

A SMALL TRIBUTE TO HIS EMINENCE AS THE DOYEN OF PRACTICAL MEDICINE, AND APPRECIATION OF HIS ZEALOUS ENDEAVOURS TO CEMENT A CLOSER RELATIONSHIP BETWEEN HUMAN AND COMPARATIVE PATHOLOGY.

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PREFATORY NOTE

It was, I fear, under too sanguine a sense of my competency that I undertook to write a short Preface to Mr. Scott's "System of Veterinary Treatment," a subject which lies far outside the sphere of my knowledge, farther from it than a work on Veterinary Pathology might have been. I yielded to the temptation, because during almost all my professional life I have been desirous of closer connections between the students of human diseases and those of the diseases of animals and plants; and, again, because in this desire Mr. Scott has been among the few who have most clearly seen the need of this integration and fulfilment of pathology as a completer science, and have done their best to bring it about. My Preface, therefore, is a token of sympathy with a fellow-worker, not of technical co-operation or community of attainments.

Notwithstanding, amid the chapters on Treatment in this very conveniently arranged System, pathology breaks out here and there; and the reader thus perceives the skill and experience of the author, who is equally at home in the clinical field and in the laboratory. I may instance, in this respect, the Section on Vaccines, and particularly that on Epizootic Abortion, in which the author carries laboratory research into the field of Immunization. He concludes from a large experience that a pregnant cow thus infected may be carried over her full term, and this, indeed, without loss of milk-supply. He emphasises the suggestion of others that more than one microbe, severally or together, may be concerned in Infective Abortion, a problem on which further research is needed.

The problem of Milk Fever still remains obscure, successful as is the cure by insufflation; the method, however, from a scientific and therapeutical point of view, is as yet purely empirical. If a few skilled investigators were set apart to study this disease, in all probability the riddle would ere long be solved. If one-hundredth part of the colossal losses of cattle-owners by Foot and Mouth Disease during the last twelve months had been bestowed on a University Department of Comparative Pathology, the nature of the disease, and the ways of its propagation and prevention, would probably by this time have been revealed. But such researches must not be just *ad hoc;* they must be a part of larger and often apparently alien but continuous series of investigations. The light on a corner must be a part of a general illumination. This the man in the street cannot be brought to understand.

In many paragraphs—for instance, under Navicular Disease—we find that such ancient remedies as blisters and setons still commend themselves to the veterinary practitioner, and no doubt derive their vogue from some rough experience of their value. Here we may note some of the secondary gains in the comparison of Human, Animal, and Plant Medicine—namely, that certain of the severer remedies such as these, or bleeding, can be used on animals, from the use of which, rightly or wrongly, in mankind we are deterred by the mental and nervous apprehensions of the patient. In the animal the bodily sense of pain seems less; and the still more deterrent mental apprehensions and aversions are absent. Thus, if the old faith in setons and blisters and poultices rests on some basis of true experience, we may look more conveniently to our veterinary colleagues to search into their possible remedial effects; perhaps by summoning to the affected part, or more generally arousing, the defensive forces of the system, serous, leucocytic, and the rest.

Another great advantage to pathology lies in the almost universal permission in animal disease to make post-mortem examination, though, on the other hand, many a scheme of cure is cut short by the economical need of killing rather than curing.

We are filled then with hope that at last Comparative Pathology is entering upon its long-delayed inheritance. The Royal Society of Medicine is strengthening itself by calling animal and plant pathologists into its counsels, and by their willing and more and more enlightened response. And a no less helpful and hopeful movement is to be seen in the arrangements made by Professor Muir and his colleagues for Comparative Pathology at the coming meeting of the British Medical Association at Glasgow this summer—a provision which, no doubt, will be made permanent if the discussions are attended and enriched by our ablest scientists in all spheres of pathology. From the programme as promised this result seems assured. No doubt in this rivalry our "Comparative friends" will not be a whit behind their brethren the physicians of man.

CLIFFORD ALLBUTT.

CAMBRIDGE,
July, 1922.

AUTHOR'S PREFACE

In presenting this treatise to the profession, I have for a long time considered a work dealing specially with the treatment of diseases would serve a useful purpose, for it must be obvious to the most casual observer that the science of medicine has of recent years expanded so enormously that specialization appears to be the inevitable outcome. Any system of comparative medicine comprehensive enough, therefore, to deal with all its branches must ever be, particularly from a reference point of view, cumbersome and unwieldy, which to the busy practitioner is a tangible drawback. It was with the object of making treatment of diseases a speciality that the present work was written, and that it may serve as a ready reference it has been arranged in alphabetical form. It was originally intended to include the more important diseases only, and, in fact, a skeleton work of the kind was almost completed at the outbreak of war. This was put aside for more pressing duties, with the result that later on it was considered there was scope for a more ambitious work, embracing all, or nearly all, the diseases that animal flesh is heir to.

As it is the first work of the kind, so far as the veterinary profession is concerned, I have laboured under the disadvantage of having no precedent to assist me as a guide. I am, therefore, fully alive to its imperfections and incompleteness, but I trust to the student it may serve somewhat as a useful chart when he embarks upon the inexact sea of practical therapeutics, and to the practitioner as a " refresher " in his routine work. It has been my endeavour throughout to emulate a rational line of treatment based upon modern pathological and medical thought, supported by practical experience, while being ever alive to the fact that Nature is the master-physician and we practitioners her humble handmaidens; consequently, the cruder methods upon which veterinary science was originally built have been eliminated, but new dicta of problematical value have not been thrust forward at the expense of older methods of recognized worth.

The prescriptions throughout the text, and the observations made upon the lines of treatment advocated, have been put to the acid test of exacting general practice after much thought and prolonged experience. Every endeavour has been made to steer clear of debatable matter where possible, preference being given rather to facts based upon reasoned conclusions. One must recognize, however, in all fairness that in practical therapeutics the speculative element is ever present, and the avenues to success are as numerous as they are diverse; hence it is no two practitioners follow the same route, and yet each may be equally successful. *This being so, the scope is, indeed, great for readers to express their views on treatment, both general and specific, and these, needless to add, I shall be most grateful to receive.* In the production of this work I have drawn freely from the school of practical experience, but I would be sinning the sin of ingratitude if I failed to readily acknowledge my great indebtedness to, and information derived from, contributors to the professional journals, and to all authors whose standard works have been my daily friends, companions, and guides during the whole of my professional career.

In the case of those diseases of whose treatment I have no knowledge, reference to the authors from whom the information has been derived has been acknowledged in the text. To my collaborators I desire to express my most grateful thanks for their willing and specialized assistance.

To Mr. H. E. Cross, M.R.C.V.S., D.V.H., A.Sc., who by his intimate knowledge is well qualified to write upon diseases of the camel. To Professor Frederick Hobday, C.M.G., F.R.C.V.S., F.R.S.E., for his articles on cryptorchidism, ovariotomy, and roaring—three subjects which he has specially made his own. To Mr. W. W. Lang, M.R.C.V.S., for his note on the stomach pump, a method of treatment he has succeeded in pioneering in this country. To Mr. A. W. Noël Pillers, F.R.C.V.S., for his treatment of parasitic diseases, a subject upon which no one is better qualified to write. To Lieut.-Colonel H. Watkins Pitchford, C.M.G., F.R.C.V.S., F.R.S.E., whose long residence in South Africa, and the great experience obtained as the scientific pioneer in checking and stamping out the specific scourges peculiar to that country—where his name is a household one—makes his work on African diseases of the greatest possible standard value. To Lieut.-Colonel G. K. Walker, C.M.G., O.B.E., F.R.C.V.S., for his diseases special to India, where his great practical experience places his authority unquestionably in the front rank.

I also desire to express my grateful thanks to Principal Bradley, M.D., D.Sc., M.R.C.V.S., for kindly reading the manuscript and for many valuable suggestions; and to Lieut.-Colonel Wakefield Rainy, C.B.E., M.R.C.V.S., for the great care he bestowed in reading the proof sheets, and for many corrections and useful suggestions.

It was originally intended to exclude illustrations, but, acting upon the advice of a colleague whose opinions I highly value, a selection was made as the work was going to the press. This could only have been accomplished by falling back upon the generosity of authors of standard works, who willingly placed their blocks at my disposal, and to each I tender unstinted thanks.

Finally, I record my best thanks to my publishers for their unfailing courtesy at all times as the work was going through the press.

W. M. S.

THE LABORATORY,
FRIARN HOUSE,
BRIDGWATER.

July, 1922.

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ABDOMINAL PARIETES WOUNDS.

Wounds in the abdominal parietes must always be looked upon by the surgeon with grave concern, their full significance being ascertained from the outset, if possible, by digital exploration. If the opening is too small to admit the index finger, the wound should be enlarged—unless it is sterile, when it should be sealed with collodium—the surface and finger prior to insertion being painted with tincture of iodine. In this manner one can obtain a fair idea of the extent of the injury, and, above all, find out if there is extension into the peritoneal cavity, or if a foreign body is present. Punctured wounds are always the most deceiving; moreover, they are liable to close externally, the pent-up pus burrowing between the strata of the wall, and even extending into the abdomen itself. Free drainage is insisted upon from the first, and if the wound is situated high up on the flank, and drainage thwarted thereby, the surgeon is called upon to make an operative wound lower down at the most dependent part, draining the pus from that point. Moreover, from those two openings the muscular tissue can be freely flushed with a *mild* antiseptic, and, what is equally important, the risk of the lodgment of dressing between the muscular strata (an undesirable condition) is reduced to a minimum. Where the wound is a large open one, immediate suturing is essential, care being taken that sufficient space is left for drainage, or, if considered advisable, a drainage tube may be inserted. In all abrasions of the abdominal wall a weakening of its function probably exists, which in itself may lead to hernia, or, what is even more serious, the passage of viscera; consequently the use of every available means to prevent these complications is advised—*i.e.*, by putting the animal on low concentrated diet; in the case of the horse, preventing his lying down, absolute quietness, and, lastly, placing a large pad of medicated wool kept *in situ* by a strong sheet passed round the abdomen and sewn tightly over the loins. This can be easily removed to apply dressings. The animal must be kept quiet for some time after the wound is healed; the writer has known of cases where a too hasty turning out to grass has led to subsequent hernia. Where the wound extends into the abdomen dry dressings are preferred to irrigation, painting the outer wound with tincture of iodine, and packing with medicated gauze, in some cases redressing every day or two. In other cases it is advisable to cast (after fixing tightly an abdominal bandage), chloroform, curette the whole wound, and suture the tunica abdominalis with interrupted strong, sterile, kangaroo tendon sutures, then the muscles, and lastly the skin with eucalyptus tape, preferably the button suture. Where peritonitis supervenes or hernia develops, the case must be treated accordingly.

ABOMASITIS.

The fourth stomach being the true digestive organ of ruminants, any inflammatory condition affecting it is usually preceded by derangement of the other three digestive receptacles. Errors of diet must be looked upon as a prolific source of abomasitis; hence the usual history in such cases reveals a sudden change of food, either from the dry to the succulent, or *vice versa*, the culminating factor in most instances being not so much the quality as the excessive quantity consumed. For this reason one can hardly believe that abomasitis exists as a primary condition, derangement having taken place already to a greater or lesser degree in the other stomachs. This is a point of importance to be remembered where treatment is considered. The food in all four stomachs, by reason of stagnation, has become unwholesome through bacterial growth liberating toxins and gases, and the establishment of a certain standard of auto-intoxication. To counteract this morbid condition, antizymotics, eliminatives, and diffusible stimulants, are indicated. One pint to 1½ pints of linseed oil, with the addition of 1 dram carbolic acid and 1 ounce oil of turpentine, is administered at the outset, and the following prescribed:

℞	Pulveris Nucis Vomicæ	ʒss.
	Acidi Borici	ʒii.
	Ammonii Carbonatis	℥ss.
	Sodii Bicarbonatis	℥ii.

M. Ft. pulv. One powder three times a day in a quart of flax gruel and 4 ounces of treacle.

Two tablespoonfuls of common salt are also placed well back on the tongue night and morning. This procedure, among other things, stimulates thirst, and, tepid water having been allowed *ad libitum*, assists in flushing out the deleterious material from the alimentary canal. All solid food must be withheld until the stomachs are unloaded, after which steamed hay, bran mashes, crushed oats, and boiled linseed, may be recommended. When convalescence is taking place mineral and vegetable tonics are indicated.

℞ Acidi Nitrohydrochlorici Dil.	ʒiii.
Infusi Quassiæ	O.ii.

M. Ft. haust. One dose night and morning after food.

Where abomasitis is due to parasitic infestation, helminthic treatment is called for in addition to the foregoing medication.

ABORTION, SPORADIC AND EPIZOOTIC.

Abortion is the pathological phenomenon of a physiological act, and when the signs of morbid labour take place in a pregnant animal there are no means of arresting its progress. The prevention of abortion, therefore, must be the practitioner's primary aim.

Sporadic Abortion.—The cause has to be ascertained and eliminated. It may be due to errors of diet, such as feeding on fusty hay or decomposing roots, frosted roots and herbage, evergreens, ergot; or malnutrition, fright, or other forms of excitement, etc. If the pregnancy is far advanced, dystocia may be an added complication, the practitioner's services being often required. In nearly every case retention of the placenta is a usual sequel. This must be removed manually before advanced decomposition sets in. Metritis also must be remembered, and when present treated accordingly. As a precautionary measure burning the fœtus is advised, and all abortions should be looked upon as *specific* from a prophylactic point of view until proved otherwise.

Epizootic Abortion.—Where this disease makes its appearance in a herd the affected animal must be immediately isolated, the fœtus and envelopes burned, and all discharges disinfected with strong dressings—viz., hot lime and carbolic acid. The floors and walls, etc., of cowsheds must be washed with strong disinfectants. As it is most unwise to allow the infected discharges to spread, it is advisable to keep the animal tied up in an isolation box so long as these exist. The rectum, vulva, tail, and buttocks of the patient should be washed daily with an antiseptic solution. Where several animals are affected, the following makes an economical and satisfactory dressing:

℞ Hydrargyri Perchloridi	ʒii.
Alcoholis	℥iii.
Glycerini	℥ii.
Aquæ	q.s. ad O.xl.

M. Ft. lotio.

This dressing is also useful for irrigating every other day the vagina and uterus, whilst the occasional insertion of an antiseptic pessary is strongly recommended. This treatment is carried out for seven to fourteen days, and the animal isolated from the herd for at least three weeks. Where the outbreak occurs in a valuable herd the agglutination test should be applied. This is a very delicate test, and when a reaction occurs in dilutions of 1 to 40 and upwards the animal is segregated from the rest of the herd and kept under observation. It may be pointed out, however, that even if an animal does react it does not follow that the said animal will abort. This is probably due to a pre-pregnancy infection, the system having reached a high state of immunity.

Immunization.—For this purpose there are three kinds of vaccines used —(*a*) virulent cultures, (*b*) attenuated cultures, (*c*) sterile cultures. In the case of the former the Ministry of Agriculture supplies live cultures of the *Bacillus abortus*, but its efficacy in practice is hampered by its limitations, inasmuch as it can only be injected into "empty" cows, and usually, when a practitioner is consulted with regard to an outbreak of specific abortion, the client's chief anxiety is to ensure the remaining pregnant cows going their full term. In such cases vaccination with attenuated cultures has given the writer, after using several thousand injections in many outbreaks, excellent results, by the employment of graduated *large* doses injected weekly into each animal for three to six weeks, according to circumstances. It is advisable, where possible, to inject the cow in the early months of pregnancy. While under this treatment there is no necessity to alter the mode of living, nor is the milk-supply affected. As regards the bull, some authorities affirm that this animal as a carrier of infection is of no account, while others, especially clinicians, hold the contrary view. The writer prefers to err on the side of caution and keep the bull away from all infected cows, and even from those which are suspected of being "carriers." Clipping the hair from the prepuce and the occasional irrigation of the penis are also sound prophylactic measures, which well repay the extra time and trouble involved. Where a herd is abortion-free the owner cannot exercise too much care in introducing fresh blood, and where the animals are valuable it would well repay the stock-owner—where circumstances permit—to insist upon the agglutination test being applied to all newly introduced animals. In this way alone can he make sure of keeping his herd free. Finally, it would appear there are other organisms—among these are a micrococcus, spirillum, paratyphoid bacillus and vibrio—which seem to exercise a considerable influence in the production of abortion in animals besides the bacillus of Bang, but on this point further investigations are necessary.

ABSCESS.

The presence of a localized collection of pus, whether superficial or deep-seated, and constituting what is known as an abscess, invariably requires surgical attention. In the initial stages, however, during which the maturation of the abscess is taking place, moist heat in the shape of fomentation is indicated. Where one is dealing with a highly infective type of abscess, combined with a diffusing cellulitis, and the condition is superficially situated, the maturing process can be cut short by free incisions, after which the parts are saturated with such lymphagogues as sodium chloride et sodium citrate solution. This procedure allows the exit of toxins, and the liberation of immunizing serum to reach the infective foci. Where an abscess shows fluctuation, lancing is indicated, the direction and situation of the incision being such as to permit the most perfect drainage. The removal of the pus has a twofold effect: first, a quantity of infective material is got rid of—*i.e.*, pus; second, a salutary flow of rich bactericidal lymph which, prior to the evacuation of the pus, has been by purely mechanical pressure dammed back, oozes through the abscess wall. If the abscess is of long standing, the cavity wall may be so indurated that the serous flow is greatly impeded, with the result that healing is slow, while the discharge may be persistent. A similar condition exists where sloughs remain in the cavity. This is often due to deficient localized cellular activity. To rectify these conditions the curette should be freely used, and to give cellular and humeral tone to the parts the sac is irrigated with a 5 per cent. solution of sodium chloride with 2½ per cent. sodium citrate solution. If these measures fail to bring about resolution, the practitioner is advised to plug the cavity with lint soaked in a strong solution of hypochlorous acid, allowing it to remain *in situ* three or four days, the granulations themselves slowly forcing out the plug. Where an abscess is deep-seated, and more especially if it is situated in the region of important vessels or organs, an exploratory puncture with a trocar and canula is advised. After lancing an abscess, it is always good practice to explore the cavity with the index finger with the view of ascertaining whether there are any adherent sloughs, pus concretions, or foreign bodies present. With regard to after-dressing a word of warning may not be out of place. The over-zealous and persistent irrigation of abscess cavities, particularly the deep-seated abscesses in the region of the major muscles, with *strong* antiseptics cannot be too severely condemned; such a procedure disturbs and very often destroys the very elements we should be doing our best to assist Nature to husband. It is only when over-accumulation of these exists that they should be got rid of, and if the drainage in the cavity is good this point is amply safeguarded.

Drainage.—It is very essential that all abscess cavities should have free drainage; hence it is important to see that the operation wound is situated on a level with, or even lower than, the floor of the abscess cavity itself. Perfect drainage means (1) the removal of pus-laden material and the excess of lymph, for, be it remembered, stagnant lymph in time loses its bactericidal qualities, and becomes a nutritive medium suitable for bacterial growth; (2) the casting off of microbic material from the healthy granulations. To procure and maintain free drainage various methods are in vogue—the insertion of a drainage tube, strips of gauze, rolls of tow, etc. The advantage of tube drainage is that the cavity may be irrigated through the tube while *in situ*. It is important, however, to point out that artificial drainage must not be persisted in too long; in time it acts as a source of irritation, causing a sinus which in itself is often difficult to heal. Where the abscess is of an indolent character, or where the abscess formations are multiple, everything points to a possible low opsonic index. It is in these cases that Nature's efforts require the assistance of a stimulant in the form of autogenous vaccination. Pus smears should be taken, stained, and examined to ascertain what bacteria are in evidence, and from these a vaccine made.

Specific Abscess.—When abscesses are of a specific nature, such as actinomycosis, discomycosis, and tuberculosis, evacuation of the pus by lancing and curetting the walls is, in the writer's experience, often worse than useless—in fact, curetting may be positively harmful by disturbing the infective foci and disseminating the areas of the disease into healthy tissues. Complete dissection, with the additional removal of a fair portion of the surrounding healthy tissue, holds out the only hope for good results; after this the cavity may be packed with gauze soaked in iodo-benzine, and then treated as an ordinary wound.

Abscess in Camels—*Abscess of the Pads.*—Treatment of abscess of the pad is as a rule very unsatisfactory, and only very rarely is a permanent cure effected. When the abscess is opened to evacuate the pus it is very difficult to keep the wound clean, and owing to the structure of the pad healing takes place very slowly. The most successful results are obtained by freely opening the abscess, thoroughly cleaning with antiseptic solutions, curetting, and plugging with tow smeared with tar or " bipp." Daily irrigations with weak solutions of antiseptics and bandaging to keep the wound clean are not very satisfactory, owing to the fact that the bandages usually get displaced and the wound becomes dirty. The essential factors for success are evacuating the pus with as little removal of cartilaginous tissue as possible and the use of weak antiseptic solutions before the tar or " bipp " is applied; strong solutions of antiseptics must not be used, as they delay the process of healing and cause destruction of tissue. The wound should be dressed daily. It is advisable to have the ground free from stones for a camel suffering from any wounds in the pads to sit on. When extensive necrosis of the pad has occurred treatment is of no avail.

Abscess of the Glands.—The glands most commonly affected are the inguinal, prescapular, and parotid. If the abscess is not thoroughly "ripe," a red iodide blister (1 in 4) should be applied. When ripe the opening of the abscess must be made in the most dependent position, so as to allow the free discharge of the pus. After evacuating the pus the wound should be irrigated twice daily with weak solutions of antiseptics—*e.g.*, Lysol, cresol, chinosol, potassium permanganate—or with normal salt solution.

It has been found that very much better results are obtained with weak antiseptic solutions than with strong solutions. Many people imagine that when dressing wounds in camels strong antiseptic solutions are required; this is absolutely wrong. When flies are prevalent care must be taken that the wound does not become "fly-blown"; to avoid this a little dry dressing of boro-iodoform or smearing the edges of the wound with castor oil acts beneficially. During the fly season it is always advisable to cover the wound with a clean cloth on which has been sprinkled a mixture of turpentine and castor oil; with a little manipulation a bandage or loose cloth can easily be adjusted. Wounds in camels usually take longer to heal than those of horses, but with proper attention satisfactory results are obtained.

Abscess from Saddle Galls, etc.—Camels are frequently subjected by their owners to very harsh treatment, and little attention is paid to saddle galls and wounds, the result being that abscesses and fistulous withers are very common. Abscesses are frequently met in all parts of the body as the results of injuries from the saddle or from bites. Those as the result of injuries from the saddle are most commonly found on the withers, hump, and lateral processes of the lumbar vertebræ, the structures involved being the skin, cartilage, muscles, and bones. The hump consists of fat and connective tissue, and once suppuration takes place, burrowing of the pus is very rapid and healing of opened abscesses is very slow. The treatment consists of opening the abscess, removal of all necrotic tissue, freely curetting, and irrigating twice daily with weak antiseptic solutions. The same precautions against flies must be taken as mentioned above.

Abscess of the Testicles.—Abscess of the testicles and of the scrotum is very frequently met with during the "must" season as the result of neglecting to treat wounds of the scrotum and of the testicles caused by bites from other camels. Treatment depends upon the severity of the case. If the scrotum is involved, the only treatment necessary is to make a free opening to allow the discharge of the pus, thoroughly irrigating the cavity with weak antiseptic solution, stitching the wound, and applying tincture of iodine. The camel's tail should be tied to one side, and a bandage applied to prevent the wound becoming contaminated. In those cases where the testicle is involved it may be necessary to remove it, but even in many cases where that organ is implicated it is extraordinary what satisfactory results are obtained in the camel by thorough irrigation of the wound, applying tincture of iodine, and stitching up the wound in the scrotum. Precautions must be taken to prevent the wounds from becoming "fly-blown."

Abscess in the Feet.—This is due to two causes:

1. A thorn or nail penetrating the pad.
2. The camel being continually worked on stony ground.

With regard to (1) the treatment consists in removal of the cause, but if the foreign body cannot be discovered recourse is had to poulticing the foot, and when the abscess is ripe to opening freely and treating the case as an ordinary suppurating wound. With regard to abscess of the foot caused by the wearing away of the pad by continual work on stony ground, working the camel on such ground should be discontinued, and if the abscess has formed it must be opened and treated as already explained, and contamination of the wound prevented by keeping the foot in a bag made of several layers of cloth.

Abscess of the Frontal Sinus.—The treatment consists in trephining. If in the early stages trephining is resorted to beneficial results are obtained, but in the later stages of the disease a permanent cure is rarely effected. The cavity should be syringed out twice daily with weak solutions of potassium permanganate till the formation of pus ceases. The frontal sinus in the camel is separated from its fellow by a central partition, each being divided up into divisions by thin partitions; it opens, not into the superior maxillary sinus, but into the nasal cavity by a narrow channel. The site for trephining is about ½ inch from the median line, and ½ to ¾ inch above a line drawn between the eyes.—*H. E. Cross.*

ACARINA. *See* **Parasitic Diseases.**

ACHYLIA.

This form of dyspepsia is not uncommonly met with in the horse and the dog, and is often the forerunner of a general unthriftiness, sometimes combined with an obstinate form of anæmia. The gastric mucosa is in a state of irritability, and the food passes into the intestines in a semidigested state; consequently colic occasionally occurs.

For the horse the following often gives relief:

℞ Acidi Nitro-Hydrochlorici Dil.	ʒii.
Tincturæ Nucis Vomicæ	ʒiii.
Infusi Quassiæ	℥vi.

M. Ft. haust. To be given night and morning after meals.

For the dog:

℞ Pepsini	grs. v.
Acidi Nitro-Hydrochlorici	♏x.
Glycerini	♏xx.
Aquæ	q.s. ad ʒiv.

M. Ft. haust. To be given three times a day after meals.

ACIDITY, GASTRIC. *See* **Dyspepsia.**

ACNE.

This disease is not very common, nor is it particularly troublesome in this country. In the horse it is seen mainly on the sides of the abdomen, under the collar, or over the saddle-mark—in fact, on parts where the harness rubs. In the dog one sees it most frequently on the head and the bridge of the nose. Irritation of the skin by rubbing is the usual exciting cause; the actual cause is a bacillus aided by staphylococci, and sometimes streptococci. If the patient is a horse he should be rested, a mild dose of aloes given at the outset, and the following prescribed:

℞ Arseni Albi	grs. v.
Ferri Sulphatis	ʒii.
Sodii Sulphatis	℥ii.

M. Ft. pulv. One powder night and morning in food.

Locally, the skin is well massaged daily, after cleansing with hot water. soap and soda, and the following lotion applied:

℞ Acidi Borici	ʒiii.
Liquoris Plumbi Subacetatis Fortioris	℥iii.
Glycerini	℥ii.
Aquæ	q.s. ad ℥xx.

M. Ft. lotio.

If the case proves obstinate, an autogenous vaccine is strongly recommended.*

ACORN POISONING. *See* **Poisons.**

ACTINOBACILLOSIS.

This disease must not be confounded with true actinomycosis, especially from a pathological point of view. From a clinical and therapeutical aspect, however, the treatment of one practically applies to the other The principles laid down for actinomycosis should, therefore, be followed here.

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* *Vide* author's "Clinical Bacteriology and Vaccine Therapy."

ACTINOMYCOSIS.

This condition is most commonly seen in cattle practice, and particularly in marsh and fenland districts. The disease tends to localization, confining itself mainly to the head and neck; sometimes, however, a generalized condition is noted, the alimentary or respiratory system being the most usual seat of invasion. The internal administration of potassium* iodide has long been advocated. When the disease is confined to the tongue, hard palate, or fauces, the writer has for some years placed the following powder on the tongue by means of a spoon, with highly satisfactory results:

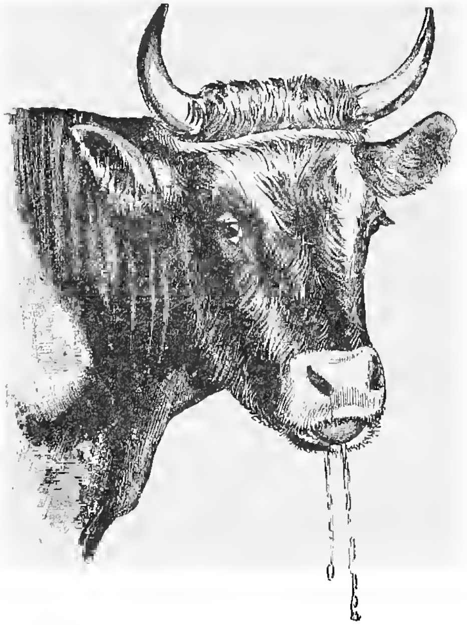

Fig. 1.—Actinomycosis of the Tongue. (Moussu and Dollar.)

℞ Hydrargyri Iodidi Rubri .. .. grs. x.
Potassii Nitratis .. .. .. ʒss.

M. Ft. pulv. One powder to be placed on tongue night and morning.

In obstinate cases, particularly where the root of the tongue or the submaxillary glands are affected after the first week of tolerant treatment, consisting of the above quantum, as much as 30 grains of biniodide of mercury *per diem* has been given without ill effects, save an occasional slight dermatitis. The administration of the drug in powder form on the tongue has a double therapeutical action—*i.e.*, local and systemic. In very obstinate cases the above prescription given alternately with full doses of potassium iodide is beneficial, and, where

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* The primary function of iodine salts in cases of actinomycosis appears to be that of an absorbent, whereby the post-inflammatory cells and tissues in and surrounding the infective foci disappear, allowing Nature's cellular and humoral elements to deal direct with the fungi.

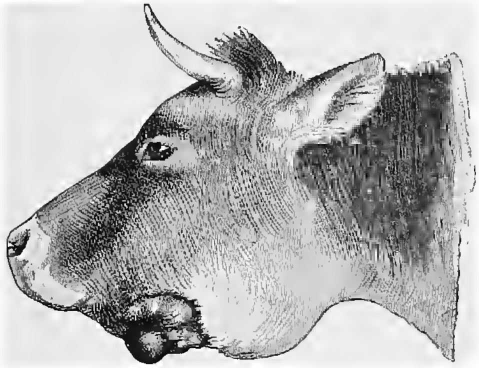

FIG. 2.—ACTINOMYCOSIS OF THE LOWER JAW. (From Moussu and Dollar's "Diseases of Cattle," etc.)

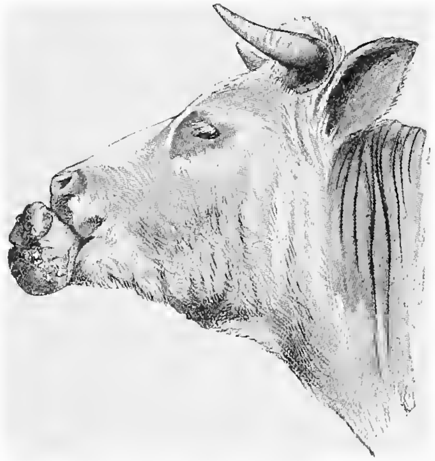

FIG. 3.—ACTINOMYCOSIS OF THE INCISOR REGION—LOWER JAW. (Moussu and Dollar.)

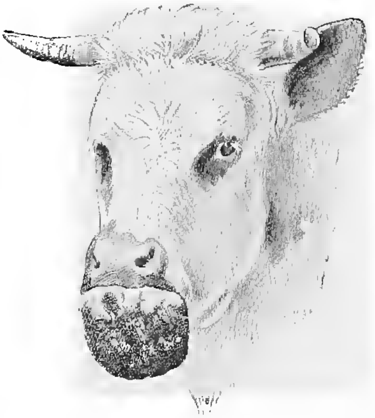

FIG. 4.—ACTINOMYCOSIS OF THE INCISOR REGION—LOWER JAW. (Moussu and Dollar.)

possible, the parts are dressed with equal quantities of tincture of iodine and carbolic acid. In those cases where the disease takes the form of a localized neoplasm usually situated in the parotideal and submaxillary regions, complete removal surgically (upon observation made of over 1,500 cases) has given the writer by far the best results. Where, however, one is loth to adopt surgical means, the injection of strong tincture of iodine sometimes dissolves the neoplasm. Further, there is a barbaric practice adopted in some districts, which consists of dressing the growth with equal parts of sulphuric acid and hydrargyrum perchloride. Apart from the cruelty of the method, deep sloughing sometimes takes place as a result, extending into vital vessels, with often fatal hæmorrhage.

Surgical Methods. — To those whose experience in these cases is limited, the writer would emphasize the following points in removing those neoplasms: The patient having been cast, the head is properly secured and placed on a sack packed with straw. An attendant rests with his knee upon the neck, holding at the same time the upper horn with both hands, and the animal is then chloroformed. The hair is clipped over the seat of operation, and the skin sterilized with iodo-benzine or tincture of iodine. An elliptical piece of skin overlying the growth is now removed, the amount depending on the looseness of the skin and the size of the neoplasm. The operator will have noted the exact situation of the swelling before casting the animal, so that the long axis of the incision will be at such an angle that, when the animal is standing, the lower end will form the most dependent part, to permit of free drainage.

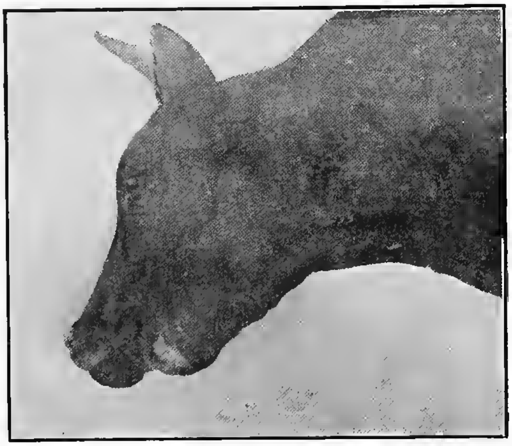

FIG. 5.—ACTINOMYCOSIS OF THE LOWER JAW.

The tumour is now carefully dissected out, the surgeon being also an anatomist, for he will encounter many important vessels which, if neglected, may lead to serious pitfalls. If the disease extends into the salivary glands, no fear need be entertained of the partial or complete removal of any of those organs. Should this be so, a flow of saliva from the operation wound will follow for a few days, after which it will cease. This is of no account. Digital surgery, where the tumour is somewhat of a floating character, is strongly advocated, for it reduces hæmorrhage to a minimum, and prevents the risk of injuring important vessels or organs. After the growth has been successfully removed, search for

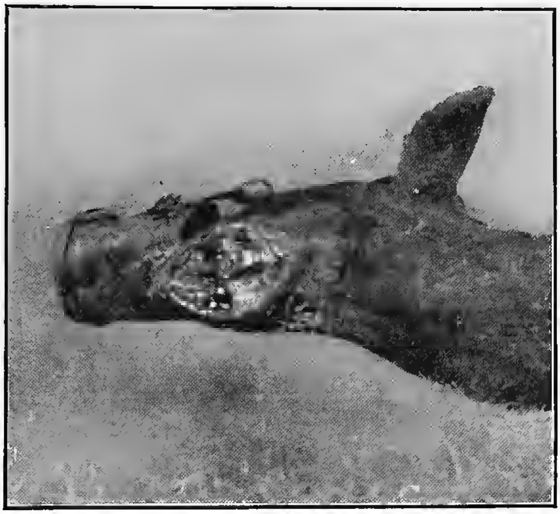

FIG. 6.—ACTINOMYCOSIS, SHOWING THE GROWTH REMOVED.

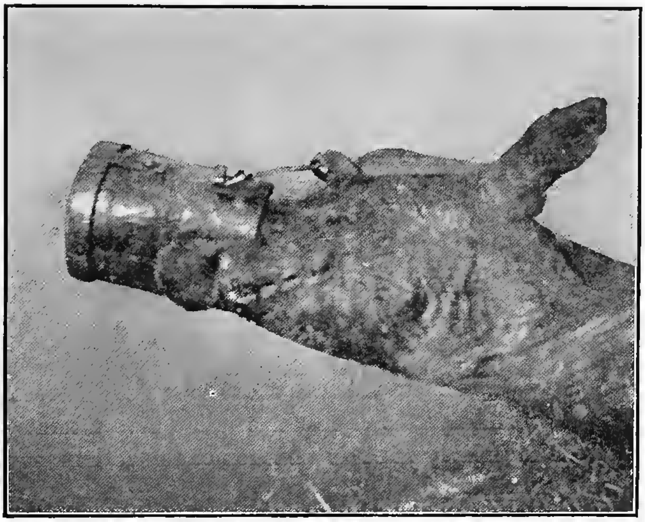

FIG. 7.—ACTINOMYCOSIS, SHOWING THE SKIN SUTURED OVER THE OPERATION SITE.

enlarged lymphatic glands in this region must be made, and, if found, these should likewise be enucleated, although as a rule the actinomyces proper appear to evade lymphatic elements. Sometimes the tumour is nothing more than a distended abscess, the pus being held together by a thin worn-out wall, which in process of dissection may give way, evacuating infective pus. If precautionary measures are not taken, this will most assuredly lead to a recurrence of the disease. Should such a misfortune occur, the writer makes it a practice to curette thoroughly the whole wound, paint with tincture of iodine, rub common salt all over the wound, thereby flushing the cavity with serum, wash in weak carbolic solution, plug with salt packs, and suture, allowance being made for free drainage at the dependent point. The after-treatment of these cases consists of removing the packs, bathing the operation wound daily with salt and water, and on the third and fourth day, if the wound is small, removing all the sutures; if large, one half of them, and the remainder four or five days later. The whole is then treated as an ordinary wound. Where the disease invades the bones of the jaw trephining and curetting the diseased area are essential; if extension has taken place to the alveoli of the molars, the operator should not hesitate to remove them if this facilitates the removal of all the diseased parts. Where the tumour is situated in the submaxillary space or on the side of the cheek, sometimes its roots extend almost into the oral cavity. In removing these *completely*, upon which the success or failure of the operation depends, great care must be taken not to cut through the oral mucosa, for the obvious reason that food contamination will follow by food lodging in the operation wound, and, further, a troublesome oral fistula will be established. To obviate these risks remove as much of the tumour as possible with the knife and the remainder with the curette, followed by thorough dressing with tincture of iodine and packing with iodized tow.

Vaccine Therapy.—In those obstinate cases which "hang fire," whether surgical or medical, the writer has by the preparation of an autogenous vaccine in a considerable number of cases obtained excellent results, and this procedure in valuable animals is strongly recommended. Save in lingual actinomycosis of recent origin where ulceration has not taken place one invariably finds, in addition to the actinomyces, a mixed infection, usually of staphylococci and streptococci, and in these cases it is hardly necessary to point out, to obtain the best results, one must embody in the vaccine not only the primary fungus, but the secondary bacteria as well.

ACTUAL CAUTERY (FIRING).

General Remarks.—In practice the two most common methods in vogue are line firing and point firing. If the patient is at all manageable it is preferable to fire him standing, and in the case of the limbs complete anæsthesia can be obtained by using local anæsthetics (see Anæsthetics). In firing an animal standing the skin is tense, and it is easy for the operator to make his lines (in line firing) coincide with the horizontal and perpendicular lines of the body, giving thereby a more pleasing finish to the eye. In firing a cast animal this is not easily obtained; the writer therefore invariably makes a point of going lightly over the skin with a hot needle, thereby marking the outline and completing the operation after casting. The following axioms are worthy of the operator's careful consideration: (1) Clip the hair closely over the site of operation. (2) Wash the skin clean with soap and water, and dry thoroughly. This prevents charred debris from accumulating on the needle. (3) In the case of line firing go over the surface lightly at first, repeating this several times, according to the thickness of the skin, until the needle has wellnigh burnt through the cutis. A knowledge of how deep one may go can only be acquired by practical experience, but upon no account must the skin be burned completely through, such an accident tending to develop into an unsightly blemish. (4) After the operation the patient is tied up short for three or four days to prevent him from biting the part, or a suitably adjusted cradle may be used. (5) If the animal is turned out to grass it is advisable to see that the ground is dry, and that he cannot get into muddy water-pits. The writer has known cases of tetanus following the lodgment of infected soil on a fired skin. (6) Many authorities advise blistering immediately after firing, others consider a blister unnecessary. The writer, unless in the case of very fine-skinned horses, blisters in ten to twenty days after firing, and is convinced that by this method better results are obtained, but vesicant blisters are never used; the antiseptic plain biniodide of mercury 1 in 8 is the one much preferred in routine practice. (7) When an animal has to be cast for sprained tendons, for example, he should be thrown with the leg to be fired resting undermost;

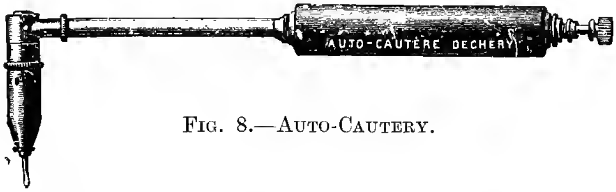

FIG. 8.—AUTO-CAUTERY.

this is released from the hobble and fixed by a strong rope to a crowbar driven into the ground; the inner aspect of the limb is then fired, after which the animal is rolled over and the outer aspect treated in the same way. By this method the skin on the outside of the limb is prevented from being rubbed after firing.

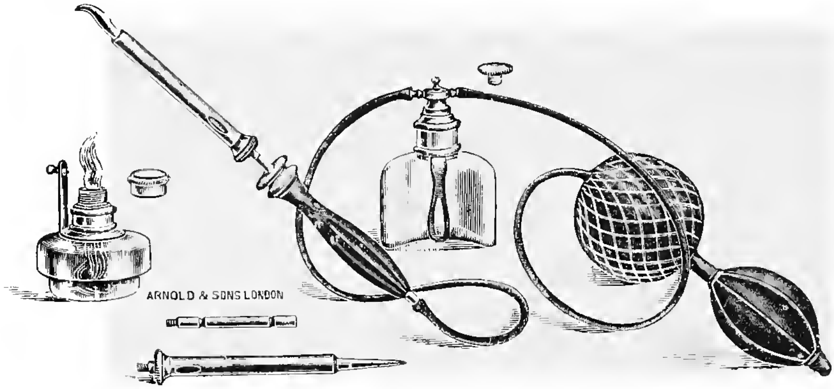

Fig. 9.—Type of Thermo-Cautery.

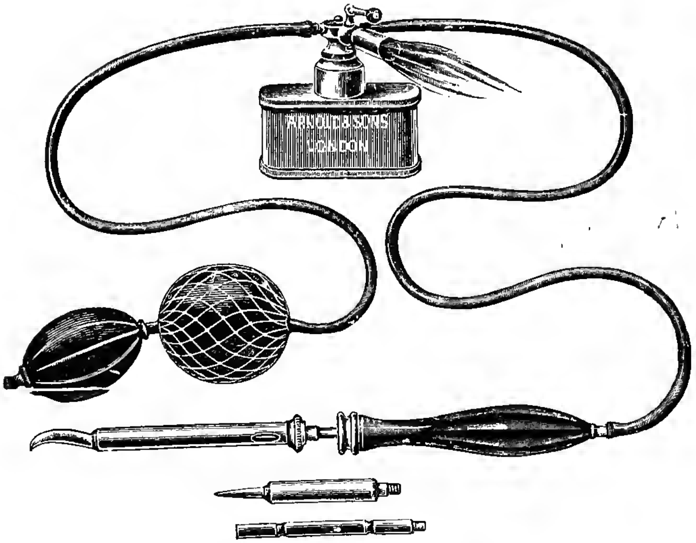

Fig. 10.—Another Type of Thermo-Cautery.

Point firing, or pyro-puncture, is practised principally in cases of exostosis, and one need not hesitate, if the growth is large, to insert the needle ½ to 1 inch deep; where, however, the diseased part is adjacent to a joint or tendon sheath care must be taken not to puncture the capsules of these parts. In applying pyro-punctures it is advisable not to have the punctured holes too close to one another, otherwise extensive sloughings are liable to occur, and, further, for a similar reason the operator must take care not to leave the hot needle embedded in the tissues too long. For the successful carrying out of these tenets practical experience will prove the best guide. Instrument-makers supply many kinds of thermo-cauteries—*i.e.*, the Pacquelin, the Degion, the Beach. Gassolin's Pyrogene Dechery has given the writer, after many years' experience, unqualified satisfaction. No mention has been made of the crude and out-of-date firing-iron, for the hope is entertained that no up-to-date practitioner ever uses those relics of the past in these days.

AGALACTIA (ABSENCE OF MILK).

The non-production of milk may be due to a variety of causes; some of these can, and some cannot, be removed. The first step, therefore, towards treatment is to ascertain the cause or causes. If the condition is due to atrophy of the mammary gland itself, nothing can be done; if to mammitis, it must be treated accordingly; if from obstruction of the milk ducts by papillomata, their removal is necessary; if attributed to general constitutional debility, good food and tonic medicines are called for. Milk stimulating foods are brewers' grains, cakes, meals, bran, and roots, good herbage, and treacle, while a useful tonic prescription is the following:

℞	Ferri Sulphatis	ʒii.
	Pulveris Nucis Vomicæ	ʒii.
	Pulveris Calumbæ Radicis Pulveris Anisi Fructi }	āā ʒii.

M. Ft. pulv. One night and morning in a quart of gruel and 4 ounces of treacle.

ALBUMINURIA.

Albuminuria as a pathological condition is more common in the lower animals than many practitioners will admit, simply because a careful examination of urine is not undertaken as a routine practice; consequently the condition is largely overlooked.

Albuminuria may be seen in diseases of the kidneys themselves, or it may exist as a condition symptomatic of lesions in organs other than the kidneys. No specific treatment can be advocated, therefore, until an accurate diagnosis is made. General treatment consists in giving a wholesome, generous diet, coupled with rest and healthy surroundings, and where the animal is debilitated such drugs as iron, calcium, phosphorus, and strychnine are indicated. Barley water as a drink should be allowed *ad lib.*

ALOPECIA.

This condition is most commonly seen in the dog, occasionally in the horse. The cause is often difficult to detect. The animal may be in good health, and except for loss of hair and a dry condition of the skin nothing may seem amiss. Treatment consists in giving a liberal diet and a course of tonic medicine. For the dog compound syrup of hypophosphites is excellent, for the horse arsenic and iron and local application of the following is advised:

℞	Acidi Lactici	ʒii.
	Spiritum Vinum Meth.	℥ii.
	Olei Ricini	O.i.

M. Ft. lini. To be rubbed in daily.

ALVEOLAR PERIOSTITIS.

If this disease is present in a young animal and the destructive processes in the gum or bone are not too far advanced, every effort should be made to save the tooth or teeth. For the larger animals an improvised stiff brush is required, while for the dog an ordinary toothbrush may be used. With these a strong solution of peroxide of hydrogen and proflavine is rubbed into the gums daily. Under this treatment the swollen gum will gradually recede and the loose tooth tightens. Where, however, the alveolus is much involved, removal of the tooth is necessary. If necrosis of the bone has set in, curetting and even trephining may be required. The after-treatment consists of the daily removal of accumulated food, irrigating the cavity with an antiseptic and plugging with gauze, or, if necessary, gutta-percha. Needless to add, until the cavity closes the animal should be kept on sloppy foods and short grass.

AMAUROSIS.

The condition of optic nerve involvement is a very difficult one to cure. Provided there are no indications of cerebral irritability, an aperient may be given, followed by a course of strychnine, phosphorus, and potassium iodide. For valuable animals electrolysis may be tried. Local application of biniodide of mercury blister to the sides of the orbit is sometimes beneficial, taking care, of course, that none of it gets into the eyes. This treatment, combined with good food and rest, is practically the limit of the therapeutist's resources. Where the condition is due to reflex irritation having its origin in the stomach, bowels, liver, or kidneys, search must be made for the cause, and where possible its removal effected by cathartics. etc.

AMPUTATIONS.

Claw (Cattle and Sheep).—In those cases (usually due to an injury) where the third phalanx bone is extensively diseased, or where the joint has become involved and suppurating, the animal rapidly loses flesh and becomes very weak, more especially if a hind foot is affected. In such cases, after palliative measures have failed to relieve the suffering and check the consequent wasting, amputation is urgently called for. The patient is cast, chloroformed, the limb fixed, and a tourniquet applied. The horn below the coronary band and all round over the seat of operation is rasped very thin. This is cut through following the line of the joint, which can be best ascertained by digital manipulation. The left hand grasps the top of the coronet and fixes it, while the right hand moves the claw laterally; in this way the operator discerns where the line of movement begins and fixity ends, indicative of the joint. Having ascertained this, the point of the lancet is inserted at intervals through the capsular ligament, and this is cut through horizontally, following the curvatures of the joint. It may be noted here that the tissues severed are the horn, the lateral ligaments, capsular ligament, extensor and flexor and perforans tendons, plantar cushion, bloodvessels, and nerves. After removal of the claw all diseased tissues are thoroughly curetted, and in addition the articular surface of the second phalanx. The after-treatment consists of painting the stump with tincture of iodine, dusting with iodoform, covering with sterile gauze, and bandaging. The dressing is allowed to remain for four or five days, and then repeated every three or four days. When the granulations have become firm, tar dressings every other day are advised. In due course skin covers the wound area, and in about a month's time the animal should be using its limb fairly well.

Where the second phalanx is involved, and it often is, amputation of this bone also is necessary. A mesial incision is carried upwards from the coronet in front to the joint, the skin dissected from the bone, and the two resulting flaps are kept apart in opposite directions, to lay completely bare the phalanx. The capsular ligament and internal and external lateral ligaments and pedal tendons are then cut and the bone removed. Open bloodvessels are ligatured, the flaps sutured over the stump, dressed and bandaged in the usual manner.

Limbs.—Compared with the human surgeon, the practitioner of comparative medicine is seldom called upon to amputate a limb. Diseases or injuries to the extremities of the ox, sheep, dog, and cat, are sometimes of such a character, however, that amputation is necessary. The following is the usual *modus operandi :* The animal, having been cast and properly secured, is chloroformed; at the seat of operation the skin is closely clipped, or preferably shaved, washed with ether soap, and painted with tincture of iodine: needless to add, all instruments and suturing material should be boiled. An assistant draws the skin downwards towards the distal extremity, a tourniquet is applied well above the seat of operation, and antero-posterior flap incisions are carried down to the bone, important bloodvessels being ligatured. The bone is then sawn off as high up as possible, the sharp edges are rounded off with a strong knife, and the flaps of skin sutured over the stump with catgut. The stump is then dressed with an antiseptic, covered with sterile cotton-wool, and bandaged. The bandage must not, however, be applied too tightly, or gangrene of the skin flaps will almost certainly follow. This dressing should be kept *in situ* for four or five days, and then removed, and, if sterile, the wound re-dressed and bandaged. If pus is present, the sutures must be removed, the stump dressed, and re-bandaged. When the stump has

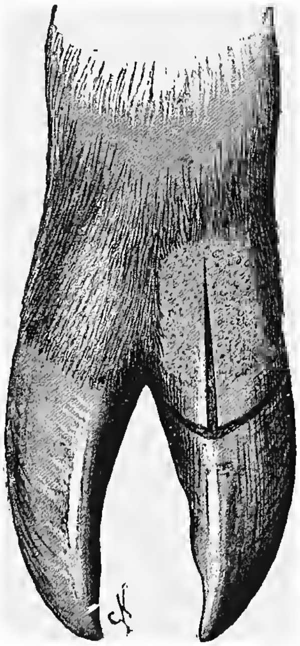

FIG. 11.—AMPUTATION OF THE TWO LAST PHALANGES: FIRST STAGE. (Moussu and Dollar, "Diseases of Cattle.")

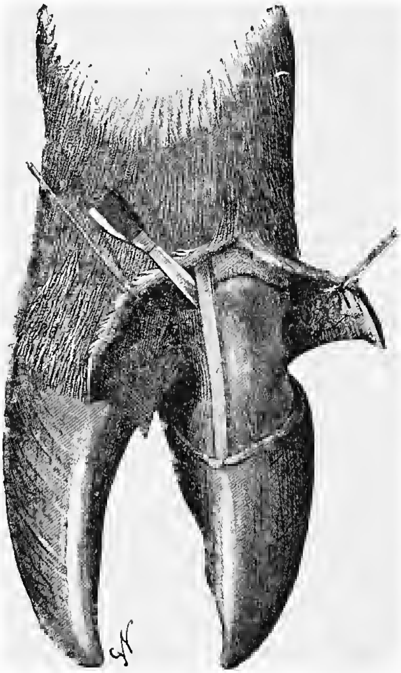

FIG. 12.—AMPUTATION OF THE TWO LAST PHALANGES: LAST STAGE. (Moussu and Dollar, "Diseases of Cattle.")

completely healed, and it is considered advisable, an artificial limb may be fixed.

Penis.—The presence of malignant growths, extensive injuries, or paralysis, are among the most common causes necessitating amputation of the penis. Various methods have been devised, but each and all must have one primary object in view, the prevention of post-operative stricture of the urethra. The patient is cast, chloroformed, the penis thoroughly washed with soap, soda, and Lysol solution; it is then drawn out of the prepuce as far as possible and fixed by a tape ligature high up above the seat of operation. The skin of the penis is painted with tincture of iodine and a catheter passed. Some authorities advise removal with a sharp-bladed hot iron extending down to the urethra, which, when exposed, is divided longitudinally and sutured to the adjacent tissues; others recommend removal with the ecraseur, treating the urethra in a manner similar to the above. The writer has obtained good results in some cases by ligaturing the penis above and below the seat of operation, after the insertion of the catheter, cutting through all the tissues of the penis down to the urethra, exposing the same a full inch, and ligaturing all visible bloodvessels. The urethra is then cut across at its distal end. Three longitudinal equidistant incisions are now made in the urethra, and the three respective flaps sutured to the surrounding tissues. Needless to add, the prepuce should be irrigated daily afterwards with a mild antiseptic, and it is advisable to pass occasionally a well-vaselined catheter.

[*Vennerholm's Operation for Paralysis of the Penis in the Horse.*—Paraphymosis in the horse is often followed by a complete paralysis of the penis, and, in consequence of the unfortunate appearance, the animal is unsaleable for work on the roads or anywhere in public view, thereby losing much of his value.

To remedy this the usual practice has been, until the introduction of Professor Vennerholm's operation, to amputate the projecting portion, in order that the appearance of the animal may again become presentable. The sequel of an amputation of this organ is not always, however, permanently successful, as stricture of the urethra is apt to follow, thus necessitating constant attention.

Vennerholm's operation obviates all this, and is particularly suited when the condition has become chronic and the tissues are pendulous and indurated. Whilst the penis is swollen and merely œdematous there is always a chance that medicinal and mild surgical measures may put it right. It is especially valuable in old-standing cases. The operation is performed as follows:

The horse is cast and fixed in the position in which the penis can be manipulated most conveniently. Either chloroform or cocaine can be used as the anæsthetic, and the parts are painted with tincture of iodine and allowed to dry.

A tourniquet is applied to the upper portion near the sheath, and the fold of mucous membrane which is to be excised is pulled together. With a sharp scalpel a circular incision is then made through the mucous membrane only, above the swelling. Similarly all round below the swelling, the parts between being stripped off and removed. Interrupted silk or catgut sutures then unite the two separate edges together, and the penis itself becomes shortened by several inches without in any way damaging its fleshy structure, or, what is of much more importance, interfering with the lumen of the urethra.

The sutures are then painted with iodine, and dressed with this each day until they are ready for removal. The organ can be pushed back into the prepuce and retained there for three or four days by sutures across the orifice, or, if the penis still hangs out and there is tension on the sutures, the penis should be slung for a few days until healing has taken place.

The horse should be kept quiet in a loose-box, and, as a rule, the result of the operation is a very marked improvement in appearance, and in a high proportion of instances a satisfactory cure.—*Frederick Hobday.*]

Uterus.—Amputation of the everted womb in large animals, such as the mare and the cow, should only be practised as a last resort—in those cases, for example, where the uterus is mortifying, where it is badly torn or bruised, or where every effort made to replace it has failed. The animal is cast and chloroformed, a sheet is wound round the organ, and by digital manipulation as much as possible of the blood is squeezed out of the parenchyma. By this procedure the writer has obtained better results than in those cases where it has not been carried out. A long, narrow needle armed with strong sterile silk, hemp, or "tacker," is passed through the centre of the uterus from above to below, usually about 3 inches from the lips of the vulva, the object being to avoid inclusion of the meatus urinarius. The suture material is then cut from the needle; one half of this is firmly drawn round the left half of the womb, the other half round the right, and each tied very tightly. This completed, another cord is firmly fixed round the whole organ over the other ligatures. The womb is now amputated about an inch below the ligatures, and if these have been securely applied no hæmorrhage will follow. The stump is next washed with Lysol solution and carefully returned into the vaginal canal. A vaginal douche should be given daily for at least a week or ten days, when all dead slough will have disappeared. In the case of removal of the womb *in situ* through an abdominal incision, the wound should be large enough to admit of withdrawal of that organ (see Cæsarean Section); the horns are then ligatured with double sutures, and in the same way the body of the uterus; the horns and the body are then excised between these double sutures and removed. The stump is dressed with a mild antiseptic and replaced in the abdomen.

Vagina.—Prolapse of the vagina, especially in cattle, sometimes gives considerable trouble. If the condition has not been long in existence and ulceration of the mucosa has not taken place, the vagina and vulva should be dressed with a mild antiseptic containing an anodyne—viz., opium, belladonna, or aconite. The organ is then returned and a vulval clamp applied, failing which three or four interrupted tape sutures are inserted through the lips of the vulva. The animal is placed in a stall and its hind legs raised by placing a considerable quantity of manure, sand, and straw bedding. In those cases which defy this line of treatment, radical amputation after ligaturing the organ gives the only hope of recovery.

ANÆMIA.

Anæmia as a condition covers a very large field, and, as may be expected, many causes are at work, either singly or collectively. To treat the condition successfully, therefore, one must ascertain what these causes are. The physiological production of blood is a very complicated process, involving as it does every organ, gland, and cell of the animal body, either directly or indirectly. It must therefore follow that the slightest hitch in the process of production will be reflected upon the blood-content itself. The causes of anæmia, as already stated, are many, and to remove them is the essential part of all good treatment.

(*a*) **Dietetic.**—If an animal is kept upon an innutritious diet for a length of time anæmia will follow, particularly if that animal is young and growing. On the other hand, the diet may be highly nutritious, but, owing to its indigestibility, dyspepsia is greatly in evidence, and consequently anæmia follows.

(*b*) **Digestive and Nutritive.**—An animal may have the best of food, and yet anæmia may be present. This may be due to a persistent condition of chronic indigestion, teething irregularities, gastro-intestinal catarrh, auto-intoxication, bacterial infections, parasites.

(*c*) **Eliminative.**—If an eliminative organ is, so to speak, thrown out of gear, the deleterious material which should leave the system by that channel is held up, and this exercises a pernicious effect—first, upon the organ in which it is located; second, upon the sensitive blood-fluid; and third, upon the whole system eventually. So far as elimination of effete material from the blood itself is concerned, the liver, as the excretory organ of the portal blood, is the most important.

(*d*) **Infective.**—Infective factors play a large part in the production of anæmia: bacterial—*i.e.*,tuberculosis, Johne's disease, strangles (irregular); parasitic—*i.e.*, gastro-intestinal; worms; hepatic; fluke, etc.

Treatment—(*a*) *Dietetic* (*for graminivoræ*).—When the food is of an innutritious character, a rich, easily digested mixed diet should be ordered—crushed oats (oats contain 13·1 milligrammes iron in 100 grains, wheat 5·3 milligrammes [Smith]), bran, the best hay, roots (cooked and raw), treacle, and linseed. For carnivoræ, oatmeal, milk puddings, Glaxo, tripe, chicken, scraped meat, fish, etc.

(*b*) *Digestive and Nutritive.*—Where the digestion has been long impaired, a carefully selected diet must be prescribed—bran, oats (crushed), steamed hay, cooked swedes, cod-liver oil, and malt extract. For horses, cattle, and sheep, a run on fresh green pasture at suitable seasons will be found beneficial. For the dog, a mixed diet should be allowed—soups, gravies, tripe, sheep's head, raw meat, meat extracts, eggs, milk, and Glaxo. If the digestive system is in a state of catarrh, bismuth and soda bicarbonate are sheet-anchors. The following are a few useful prescriptions as stomachics for horses and cattle:

℞ Bismuthi Subcarbonatis	ʒii.
Sodii Bicarbonatis	℥ii.

M. Ft. pulv. One three times a day in a pint of gruel or in food.

Or—

℞ Pulveris Nucis Vomicæ	ʒii.
Sodii Carbonatis	℥ii.

M. Ft. pulv. One three times a day in a pint of gruel or in food.

Or—

℞ Pulveris Zingiberis	ʒii.
Potassii Bicarbonatis	℥ii.
Ammonii Carbonatis	ʒii.

M. Ft. pulv. One three times a day in a pint of gruel or in food.

Or—

℞ Pulveris Gentianæ Radicis	ʒii.
Potassii Carbonatis	℥ii.
Pulveris Tragacanthæ	℥ii.

M. Ft. pulv. One three times a day in a pint of gruel or in food

For dogs :

℞ Sodii Bicarbonatis	grs. x.
Ammonii Carbonatis	grs. v.
Succi Taraxaci	ʒii.
Tincturæ Cardamomi Co.	♏xv.
Aquæ Menthæ Piperitæ	q.s. ad ℥iv.

M. Ft. haust. One tablespoonful to be given thrice daily before food.

Or—

℞ Bismuthi Subcarbonatis	grs. x.
Potassii Bicarbonatis	grs. xv.
Tincturæ Nucis Vomicæ	♏iv.
Acidi Hydrocyanici Dil.	♏iii.
Aquæ	q.s. ad ʒii.

M. Ft. haust. One teaspoonful to be given thrice daily before meals.

Where constipation is much in evidence, the following is advised in pill form:

℞ Aloini	gr. $\frac{1}{2}$
Extracti Nucis Vomicæ	gr. $\frac{1}{10}$
Ferri Carbonatis	grs. ii.
Extracti Belladonnæ Vir.	gr. $\frac{1}{4}$
Extracti Gentianæ	q.s.

M. Ft. pil. One night and morning.

(*c*) *Eliminatives.*—Whatever may be the cause of anæmia, it is good practice to start with a mild aperient. For the horse, aloes and calomel; for the ox, sulphate of magnesia; and for the dog, aloin or podophyllin. Each of these unloads the bowels of toxins, stimulates the lacteals, and lowers the blood-pressure, thereby relieving congestion, particularly of the liver, while acting at the same time as a hepatic stimulant and relieving the blood of accumulated toxins.

(*d*) *Infective.*—To destroy the bacteria and neutralize their toxins, specific antibacterial measures are called for, while in the case of parasitic infestation treatment must be directed against their removal. A description of these will be found under their respective headings.

Specific Treatment.—Having restored the various organs to a more or less healthy state (we say more or less, because it is impossible to restore any organ to a perfect state unless that organ is having a regular and perfectly normal supply of blood brought to it), it is now time to set about improving the quality of the blood, and for this one's sheet-anchor is iron in some form or other; and in the case of dogs, reduced iron is best. Arsenic is also a valuable agent. The following prescriptions the writer has found very satisfactory:

For horses and cattle:

℞ Arseni Albi	grs. v.
Ferri Sulphatis	ʒii.
Sodii Bicarbonatis Sodii Chloridi	āā ℥ii.

M. Ft. pulv. To be given night and morning in food.

Or—

℞ Tincturæ Ferri Perchloridi Acidi Phosphorici Dil.	āā ʒii.
Infusi Calumbæ	q.s. ad O.ii.

M. Ft. haust. To be given night and morning.

Or—

℞ Liquoris Ferri Perchloridi Dil.	ʒii.
Infusi Quassiæ	q.s. ad O.ii.

M. Ft. haust. To be given night and morning.

For dogs :

℞ Tincturæ Ferri Perchloridi	♏v.
Liquoris Arsenicalis	♏ii.
Glycerini	♏x.
Aquæ	q.s. ad ℥ss.

M. Ft. haust. One tablespoonful night and morning.

Or—

℞ Liquoris Arsenicalis	♏ii.
Liquoris Ferri Perchloridi	♏v.
Tincturæ Cardamomi Co.	♏xv.
Aquæ	q.s. ad ℥ss.

M. Ft. haust. One tablespoonful night and morning.

ANÆSTHESIA (GENERAL).

Where possible, an animal should be fasted for twelve to twenty-four hours, the heart and lungs examined for any irregularity, and in the horse symptoms of jugular pulse noted. Very fat animals should be looked upon with suspicion, and treated accordingly. The agents usually employed in veterinary practice are ether, chloroform, ether and chloroform combined, or alcohol, chloroform, ether, the latter constituting the A.C.E. mixture in the proportion of 1 : 2 : 3. Where a delicate patient is being dealt with, ether is a safer anæsthetic than the A.C.E. mixture; while chloroform is the best anæsthetic for general work, it also carries with it the most danger.* The administration of a general anæsthetic may be carried out by either the open or closed method. For the open method, a sponge and a towel are all that is necessary, but, of course, a considerable quantity of the anæsthetic is wasted. By the closed or inhaler method the technique of administration is more refined and more exact, and as there are several excellent inhalers to be had, every surgeon should possess one. For the horse and the ox, the inhalers the writer prefers are those which cover the nose only, leaving the tongue and mouth free. Some authorities prefer to draw the tongue forward and fix it by means of a tape. For the dog, Hobday has perfected an excellent inhaler which every canine surgeon should possess. Contrary to the views entertained by the older practitioners, all the domestic animals make good subjects for general anæsthesia, if one might except the cat and the pig. With these two

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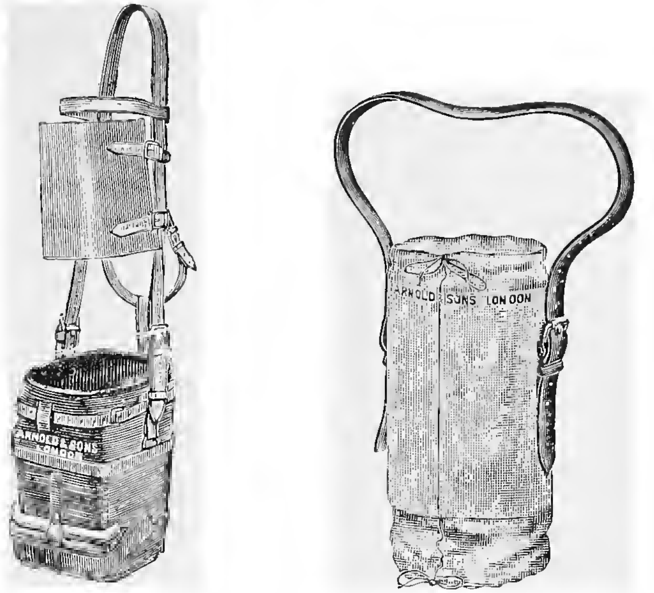
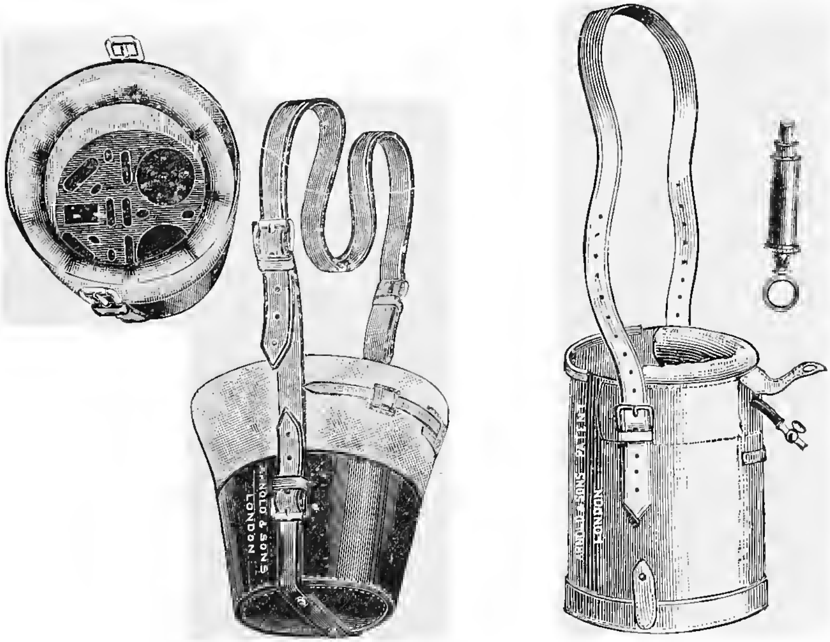
* As a general rule, it may be stated that chloroform is the best anæsthetic for routine practice. If the patient is old, very fat, or showing indications of vital organic disease, ether or A.C.E. should be used, in which case it must be remembered that in the latter anæsthetic the chloroform is diluted and that more time must be allowed for anæsthesia.



Carlisle's pattern. Cox's pattern.



Nelder's pattern. Dowell's pattern.

Fig. 13.—Types of Chloroform Inhaler for Large Animals.

animals greater care must be exercised and plenty of time allowed. Regarding dosage, this varies so considerably even in the same species that one cannot dogmatize. The following are the average doses estimated after considerable experience of chloroform anæsthesia:

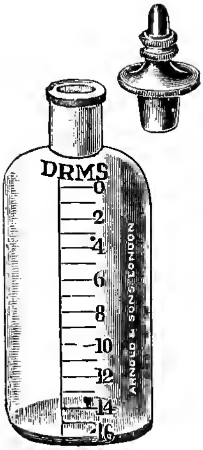
For horse	1 to 3 ounces.
,, foal	4 to 6 drams.
,, cattle	1 to 4 ounces.
,, sheep, goat, pig	3 to 8 drams.
,, dog	1 to 4 ,,
,, cat	½ to 2 ,,

Where ether or dilutions of ether and chloroform are used, these doses may usually be increased one-quarter to one-half. The anæsthetist is, however, well advised to treat each case on its own merits, remembering that each animal may have an idiosyncrasy towards chloroform to a greater or lesser degree. An animal in the anæsthetic state must be carefully watched, not only to ascertain if enough anæsthetic has been given, but also to be on the alert for the first manifestation of untoward sequelæ.

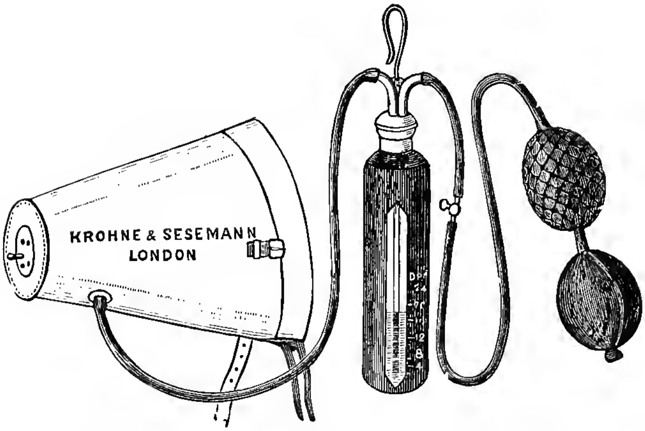
Respiration.—The respiratory movements from beginning to end must be kept under close observation. Before the patient becomes unconscious there may be noted numerous variations in deep, shallow, quick, low rhythms. As soon as unconsciousness is reached, the breathing becomes free, slow, peaceful, and regular, just like a normal sleep, and this is the stage the anæsthetist aims to maintain. If stertorous breathing sets in, the tongue should be pulled well out of the mouth. Care should be taken to see no pressure or weight is placed upon the chest wall.

Pulse.—In the early stages the pulse is rapid and full, owing largely to excitement, but as anæsthesia reaches completion it becomes slow, regular, and steady. In severe operations, where a liability to surgical shock exists, the writer has in some cases noticed that the pulse gives the first warning by becoming faster, smaller, with a running down tendency.

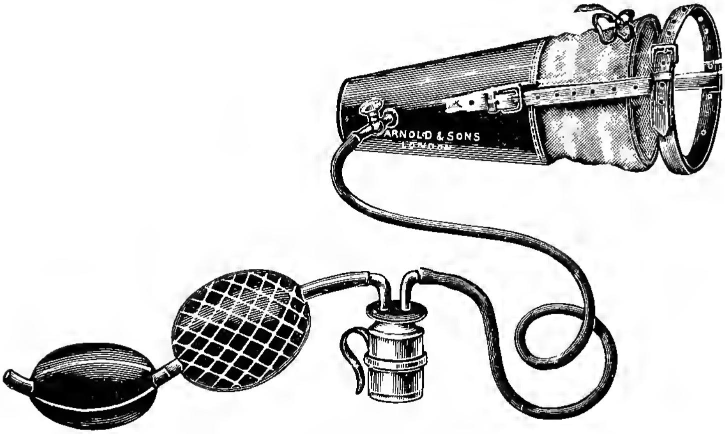
Corneal Reflex, Size of Pupil, Muscular Relaxation.—When an animal is not fully under the anæsthetic, touching the cornea with the finger elicits movement of that organ, and also of the eyelids. It does not follow, however, that if a reflex occurs the animal suffers surgical pain, and this is most noticeable in highly sensitive animals. As the anæsthesia deepens the pupils contract, and, inversely, as the pupils dilate and the corneal reflex returns indications are present of a return to consciousness. On the other hand, if there is no corneal reflex and the pupils are dilated these must be looked upon as danger signals, and the anæsthetic should be suspended until the pupils again contract. In advanced anæsthesia



Drop-bottle for administering the anæsthetic.



Junker's Inhaler. (Krohne and Sesemann's pattern.)



Hobday's Inhaler.

FIG. 14.—TYPES OF INHALER FOR SMALL ANIMALS.

complete relaxation of the muscles takes place, and in certain operations, such as parturition, this condition is very necessary.

Danger Signals.—These may be due to an overdose of the anæsthetic, surgical shock in severe operations, loss of blood, or all three combined. The untoward symptoms may come on rapidly, and are alarming from the outset, or they may be gradual. The respiration becomes shallow, the pulse faster and smaller, the pupils dilate, and there is no corneal reflex. The muzzle and mouth in cattle, and the mouth and tongue in other animals, become cold, and the breathing at this stage may stop altogether. In these cases the anæsthetic must be stopped at once, and energetic measures adopted with vigour. In the case of the horse and ox, all hobbles and ropes must be removed. An assistant should grasp the tongue by means of a cloth to prevent it slipping, and jerk it backwards and forwards about twenty times to the minute; in like manner and at similar intervals regular pressure should be applied to the floating ribs. In addition, the fore leg may be raised and lowered by grasping the foot, synchronizing with the normal respiration. Cold water may be dashed over the head, and hypodermic injections of strychnine and brandy or pituitary extract over the cardiac region given; ammonia and, where possible, oxygen inhalation should also be administered. In the case of the dog and cat, the body should also be raised at intervals, allowing the head to remain pendulous for a short period. Hobday recommends for the dog the dropping of hydrocyanic acid on the back of the tongue. After all operations the muzzle should be removed and the anæsthetized animal given ample time to regain consciousness before he is allowed to rise, all food being withheld for two to four hours.

Standing Anæsthesia.—Some practitioners prefer to anæsthetize their equine patients standing, in which case chloroform is usually the agent used. The inhaler is securely fixed on the nose, the minimum quantity of air being allowed, and with a double rope, one on each side, fixed to the head halter, an assistant is deputed to each, which is held tight. In a short time the animal staggers, and usually goes down quietly, the head being steadied in the meantime by the ropes.

ANÆSTHESIA (LOCAL).

Local anæsthesia is generally practised in three different ways: (1) Local application; (2) freezing; (3) infiltration.

Local Application.—The drugs most commonly used here are cocaine hydrochloride, novocaine, or eucaine hydrochlorate in aqueous solution. For such a sensitive organ as the eye a 4 per cent. solution is strong enough, for mucous membranes 5 to 10 per cent., and for the skin 10 to

20 per cent. The advantage of eucaine over cocaine is that it is less toxic. A few drops of 1:1,000 adrenalin may be added with benefit to the above solutions.

Freezing.—The most useful agent is ethyl chloride, which is supplied in 1 to 6 ounce glass cylinders with a suitable spray outlet and stop-cock. In freezing the skin, care must be taken to see that the spray is very fine, that the sprayer is not held to the parts too closely, and that the freezing is not sustained too long, because without these precautions sloughing is liable to occur.

Infiltration.—Several drugs are used for this, and most practitioners have their own preference. β-eucaine hydrochloride is made up in tablet form by Parke, Davis and Co., and for dogs ½ to 1 grain dissolved in 20-minim sterile water to which has been added 1 to 2 minims of 1:1,000 adrenalin makes an excellent analgesia. In equine and bovine practice, 2 to 3 per cent. solution of eucaine is very effective. Cocaine hydrochloride is also used in equine practice, but, owing to its toxicity, canine surgeons prefer eucaine. Cocaine may be injected into the horse in solutions of 12 to 20 per cent., and will be found very useful in firing the limbs, removal of the smaller tumours, etc. Novocaine combined with adrenalin is much used in dental surgery in strength of 4 to 6 per cent.

Prior to infiltration the skin must be painted with tincture of iodine, and where a wide surface has to be anæsthetized it is well to inject the solution at several points, after which the skin is kneaded to diffuse the solution. Anæsthesia usually takes place in five to ten minutes after injection. It lasts from twenty to thirty minutes, and sometimes even longer. In the case of firing the limbs below the knee, the solution is injected into the internal and external metacarpal nerves. Needless to add, the needle and syringe prior to use should be sterilized.

ANAPHYLAXIS.

Hypersensitiveness in the lower animals undoubtedly does occur in the processes of metabolic changes, as seen in some diseases. It has also been demonstrated experimentally in the horse, pig, dog, and cat by the introduction of proteins, the most common symptom being a short rise of blood-pressure at first, followed by a sudden fall, and, where the fall is rapid, death may ensue. When such a case is diagnosed, the surgeon's first duty is to raise the blood-pressure by every means in his power by the administration of diffusible stimulants, ammonia, brandy, or coffee, and the hypodermic injection of strychnine or pituitrin. Where possible, the head should be lowered in order that the blood-flow may be restored to the brain.

ANASARCA.

The cause for this condition must be carefully searched for and, where possible, removed. As there is in these cases a great drain upon the metabolism, a rich, highly nutritious, and easily digested diet is called for, and such medicinal agents as sulphate of iron and calcium lactate combined with vegetable tonics prescribed.

ANGINA PECTORIS.

This condition is seldom seen in animals, and, where diagnosed as such, it invariably proves fatal. The paroxysms may be relieved by the inhalation of nitrite of amyl and the hypodermic injection of atropine and morphine, on the presumption that the disease is due to sudden contraction of the coronary arteries; these drugs acting as vaso-dilators.

ANKYLOSIS.

Where an acute inflammatory condition exists in or around an articular joint, the throwing out of new deposits is almost always inevitable. When the deposit is purely fibrous, much can be done by repeated absorbent blisters; failing this, forcible traction is advised, and for this, if necessary, the animal should be cast and chloroformed. In the case of the knee or hock, a rope fixed round the fetlock-joint and drawn steadily backwards and forwards by one or more men gives the necessary force required to break down adhesions. With an immature animal, however, care must be taken to regulate the force applied, inasmuch as long bones are liable to give way at their epiphyses. Where osseous deposits have developed, there is greater difficulty in breaking down the adhesions, and, further, the after-results are not so satisfactory. The subsequent treatment consists of applying absorbent blisters from time to time, and if the animal does not evince much pain, steady, slow work often effects great improvement.

ANTHRAX.

Anthrax as a rule runs an acute course, so acute, in fact, that treatment is of no avail; in many cases the animal is found dead without anyone detecting signs of previous illness. Where, however, the condition tends to localization, as seen in the horse and the pig, good results may follow the administration of full doses of Sclavo's or Mulford's serum, which is both antimicrobic and antitoxic. Prophylactic treatment consists of the inoculation of attenuated virus of two strengths into animals which are susceptible to infection, or where the disease has broken out in a herd. Anthrax being a scheduled disease, the law does not admit of curative treatment, and as it is so sporadic in its nature, prophylaxis is seldom practised in this country.

Anthrax of the Camel.—Treatment consists of (1) curative treatment; (2) preventive treatment.

1. *Curative Treatment.*—Owing to the rapid course that the disease runs, curative treatment is of little avail; moreover, from the fact that anthrax is communicable to man, it is unwise to attempt any curative treatment. Our efforts should, therefore, be applied to prevent the disease from spreading, and preventive treatment should be taken in hand at once.

2. *Preventive Treatment.*—We can consider the best means for the protection of the healthy animals and the prevention of the spread of the disease under the following headings:

(1) Ascertaining the source of infection.
(2) Disposal of the carcasses of the infected animals.
(3) Vaccine and serum inoculation.
(4) Segregation of in-contact animals.

(1) *Source of Infection.*—The source of infection may be:

(*a*) The water from which the camels have drunk.

(*b*) The straw or grain.

(*c*) Infected ground on which the camels have been browsing, or where they have been tied up.

(*d*) The camels chewing anthrax infected bones when out browsing in the grazing grounds.

When anthrax has broken out amongst a herd of camels, the water, fodder, and browsing area should at once be changed, and the camels divided up into batches, which should be kept apart. The temperatures of all camels should be taken for one week, and those showing an abnormally high temperature should be isolated and kept under observation.

(2) *Disposal of Anthrax Carcasses.*—No post-mortems should be made, but smears of blood from the ear of the dead camel should be taken and submitted to microscopical examination. One of the best methods of staining for anthrax bacilli is as follows:

Fix the smear by heat, stain with hot carbol fuchsin, wash with water, decolorize with 1 per cent. solution of acetic acid, wash and dry. By this method the capsules are well demonstrated.

The carcass is best disposed of by burning, but if death has occurred where fuel is difficult to obtain, the carcass should be deeply buried, preferably with lime. The place where death occurred should be well disinfected, and all gear of the dead camel should be burnt.

(3) *Vaccine and Serum Inoculation.*—Up to the present no investigations have been carried out in connection with vaccines or sera for the protection of camels against the disease, but the injection of 100 c.c. of serum from bovines produces no harmful effect in camels, so that doses of 100 c.c. of antianthrax serum prepared from bovines may be injected into camels without danger.

(4) *Segregation of In-Contact Animals.*—All camels that have been in contact with the infected camels should be segregated from all other camels for at least ten days, and their temperature taken daily, and not until ten days have elapsed since the last case has occurred and their temperature has been normal for that period should they be allowed to come in contact with other camels.—*H. E. Cross.*

ANUS, DISEASES OF.

Anal Atresia.—Imperforate anus is not very often seen in the domesticated animals. In the writer's experience this condition occurs most commonly in puppies, lambs, and pigs. Attention is usually directed to the defect by the animal straining, the absence of fæces, and usually by a bulging of the perineal skin below the tail. When the latter condition exists the operation is simple, and consists of a crucial incision being made over the bulge, the angles snipped off with a pair of scissors, and after the evacuation of the fæces the insertion of a lubricated finger into the rectum as far as possible; an ordinary tallow candle also answers the purpose. Where no evidence of an anus exists, a vertical incision is made through the perineum over the anal site; the underlying tissues are then carefully dissected until an opening into the rectum is found. The mucous membrane of the rectum is then picked up and sutured to the perineal skin. After-treatment consists of the administration of medicinal paraffin or linseed oil, and the daily injection of a little carbolized oil into the rectum. The occasional insertion of a tallow candle also tends to prevent stricture.

Anal Fistula.—Fistula in ano, when occurring in animals, is usually a troublesome condition. It may be blind external or blind internal. At the commencement palliative measures should be tried. These consist of curetting the sinus and injecting B.I.P.P. or packing the sinus with gauze soaked in a solution of sulphate of zinc. If these fail, radical measures must be adopted. An anæsthetic having been administered, the bowel is emptied with an antiseptic enema, a probe is passed along the sinus, and its direction and extent noted. The sinus is then laid bare, and if need be the sphincter ani muscles are cut *straight* (not slanting) across. Search is then made for any branching sinus or pockets, and if these are found they must too be laid open. All granulating tissue is then thoroughly curetted, and the cavity packed with acid, boric, and iodoform gauze, the packing being repeated daily. The bowels must be kept freely open by the administration of aperient medicines and laxative diet. When surgical measures fail, auto-vaccine therapy should be tried, the organism usually present being the *Bacillus coli communis.*

Anal Pouches, Impaction of.—In the dog, especially pampered dogs, these pouches, which are found one on either side of, and just inside, the anal sphincter, sometimes become packed with grey sebaceous secretion which by reason of its consistence is unable to pass through the narrow opening of the pouch. The accumulation and retention of this material give the animal considerable pain and, by reason of the pressure exerted upon the anus and rectum, tend to produce constipation or at least retention of fæces. The treatment consists of squeezing the pouches between the finger and thumb, when a thick, putty-like mass will be seen oozing from the anus. To prevent re-accumulation, it is advisable to irrigate the pouches with boro-glycerine lotion. A course of laxative medicine should be given, and the patient ordered sufficient exercise.

APHTHA CONTAGIOSA. *See* Foot and Mouth Disease.

APHTHOUS STOMATITIS.

This disease is seen in all the lower animals. It may be symptomatic of gastric disorders, but more often it is due to local irritation through feeding animals on foods containing hard fibres which irritate and lacerate the mucosæ. Sand is a common cause of the disease in sheep, hence it is often seen in those animals feeding on roots in wet seasons. The mouth harbours at all times many bacteria, and any injury to the mucosæ converts their saprophytic into pathogenic propensities. Where irritating foods are the exciting cause, these should be stopped, and the mouth gargled daily with boracic acid dissolved in normal saline solution. Permanganate of potash also makes a clean and cheap mouth wash, and a saline aperient at the outset of the disease always proves beneficial. In some cases and at certain seasons aphthous stomatitis takes on a serious form, affecting a large number of animals, particularly lambs and calves. In such outbreaks, needless to add, rigid isolation and the persistent use of antiseptic mouth washes with the free application of disinfectants are called for.

APOPLEXY.

Apoplexy is the sudden loss of sensation and voluntary movement consequent upon the rupture or occlusion of a cerebral vessel or vessels.

If such a case is diagnosed and treatment attempted, the patient should be placed in the most comfortable recumbent position, particular care being taken to keep the head from being tossed about; it must be maintained in an elevated position, and the body kept warm. Attempts should be made to lower blood-pressure by venesection, and the administration of such agents as amyl nitrite and nitro-glycerine. A full dose of physic (calomel being preferred to any other) should be given at once. Cold water applications to the head and spine, or, better still, the continual use of ice bags to the poll and neck, are advised. As a rule, however, true apoplexy in animals is a fatal and incurable disease.

ARTHRITIS.

Arthritis is a diseased condition of the joints, and as such occupies a position of great economic importance, particularly in the horse, as it interferes with that animal's most useful function—*i.e.*, the power of locomotion. From a therapeutical point of view arthritis may be divided into two heads: (*a*) Traumatic or local, and one would include under this sprains and bruises; (*b*) rheumatoid or constitutional. Traumatic arthritis may be subdivided into "open" or "closed." Open traumatic arthritis is a serious condition, and unless the practitioner is able to see the case early, grave consequences of organic joint trouble are sure to follow, with subsequent ankylosis. If pus is present in the joint, this must be removed by irrigation with normal saline solution, followed by the injection of tincture of iodine; also a hose-pipe should be fixed to the joint in such a way with bandages that a continuous flow of water envelops it, the object being to keep the temperature low in order to limit bacterial growth and to wash away the ever-accumulating bacterial laden lymph from the joint. As an adjuvant to this, the application of Bier's treatment (where it can be used) is strongly recommended. This should be applied at intervals between the hose-pipe applications. If the case is seen before inflammatory or suppurative conditions have set in, there is no reason why these should develop provided proper precautions are taken. If the injured joint is the knee, the cavity must be irrigated and cleansed with saline solution, and afterwards washed out with iodo-benzine; the whole of the exposed parts are then painted with an equal quantity of tincture of iodine and oleum caryophylli, repeating the application every forty-eight hours. The wound is then dusted with boric acid and creta preparata (1 in 6), and the joint swathed in cotton-wool and bandaged; over this a knee-cap is fixed to keep the bandage in position. To lower tension, a dose of physic must be given and a low diet ordered. If the patient evinces much pain, slinging is advised. Where arthritis is due to a sprain or bruise, without cutaneous abrasion, the primary object the practitioner has in view is to keep down blood-tension, and so prevent effusion, which, if allowed to accumulate, tends to interfere with free motion after recovery; therefore, a dose of physic must be given and gentle exercise ordered, also the application of hot fomentations with common salt, after which the following lotion is well massaged into the joint:

℞	Tincturæ Aconiti	℥ii.
	Liquoris Plumbi Subacetatis	O.ii.

M. Ft. lotio. To be applied night and morning.

When the acute stage has been reduced, a mild blister should be applied, and repeated in due course if necessary.

Rheumatoid Arthritis (*see also* **Rheumatism**).—If by this condition a disease having a uric acid diathesis associated with it is understood, the term is usually a misnomer, for if old, pampered dogs are excluded, uric acid in local excess does not give our patients much trouble. The rheumatoid arthritis seen in practice is in most cases, if not in all, due to bacteria or their toxins, or both. To attack rheumatoid arthritis successfully, the bacteria must therefore be located and, if possible, destroyed, and their toxins eliminated. These bacteria may have found their way into the joint via the blood-stream, in which case septic foci exist in some other organ of the body. This condition is seen following certain cases of influenza, joint evil and strangles, for example, and here invasion is often secondary to that of the respiratory tract. The treatment must in these cases be focal and local. It may be taken as a *sine qua non* that rheumatoid arthritis indicates the existence of a lowered vital index, and a liberal diet, together with good hygienic surroundings, is called for. The aim of the surgeon should be to neutralize the poison, eliminating it by the quickest route from the system, and to destroy the bacteria which elaborate these toxins. The latter is accomplished by the agency of vaccines and sera, the former by those drugs which are known to enter into combination with the toxins, facilitating their easy elimination. These are salicylic acid, salol, benzosol, quinine, and guaiacol carbonate. Local application consists of hot fomentation and rubbing into the joint tincture of iodine, or an astringent lotion such as lotio albus. Where the synovial bursa is distended with fluid, great benefit is derived from aspiration. By this process the fluid, heavily laden with toxins and even bacteria, is removed, facilitating the admission of rich bacteriotropic serum. Further, this process, in the writer's experience, considerably reduces the risk of joint deformity and ankylosis, sequelæ greatly to be dreaded in these cases. In all arthritic affections, when the acute stage has become reduced, repeated blisters are indicated, and firing may have to be resorted to.

ARTIFICIAL EYE.

Artificial eyes are principally used in horses and dogs. After removal of the eye-ball, the soft structures in the eye socket should be hardened with an astringent lotion such as alum or zinc before the artificial eye is inserted. They are made of glass, hard rubber, or vulcanite, in colours comparable with the normal eye. To insert the eye, the upper eyelid is lifted upwards and the edge gently pushed upwards and inwards; the lower lid is then drawn outwards, and the lower edge thrust under it. Suppuration will occur, and the eye must be removed once or twice daily and carefully cleaned in boric lotion or Lysol, and also the orbit, before reinsertion. As time goes on and the pus is reduced, less frequent removal of the eye is required.

ASCARIDES. *See* Parasitic Diseases.

ASCITES.

The treatment of this condition is largely palliative, inasmuch as it is usually symptomatic of grave organic diseases affecting the heart, liver, kidneys, or peritoneum. It is most commonly seen in the dog and cat; in the latter usually in the chylous form. The horse and ox are very seldom affected with abdominal dropsy. When the accumulation of fluid is excessive, the abdomen distended, and the respiration laboured, tapping is indicated; but care must be taken not to remove too large a volume of fluid at a time, owing to the danger of syncope in *small* animals. In the larger animals tapping is best practised in the standing position, whilst in the dog and cat the upright position, sitting on their haunches, is best. Needless to add, the skin, trocar and canula must be sterilized prior to the operation. It may be necessary to tap daily, the patient being kept on a *dry*, *rich*, *concentrated diet*, and little liquid allowed. Diuretics, such as oleum copaibæ; and potassium iodide, if there is hepatic trouble, have given fair results. In cardiac cases, digitalis, sparteine, and potassium iodide. Where the calcium content of the blood is low lactate of calcium is indicated, and in all cases iron and vegetable tonics act beneficially. Saline aperients should also be given at regular intervals. In obstinate cases the writer has obtained good results by inserting a sterile rubber drainage tube through a large calibre canula which has been previously passed through the abdominal wall; the canula being withdrawn, the tube is left *in situ* and the free end sutured to the skin. This drainage tube may be left in position ten to fourteen days, the fluid being drained away as it accumulates.

ASPERGILLOSIS.

The pathogenic effects of Aspergilli are most commonly noted in birds. The writer has, however, come across isolated cases in foals and calves. The air passages are the usual organs invaded, although it may be pointed out the Aspergilli have been found existing in the respiratory tract as simple saprophytes. Where this condition is diagnosed, the writer has obtained the best results from *auto-vaccination* combined with intratracheal injection of lugol solution and the internal administration of potassium iodide c. sodium citrate. As a prophylactic measure, the diseased animal should be segregated, and all foods suspected of harbouring the mould withheld; the housing accommodation should be thoroughly disinfected and fumigated. Plenty of fresh air and sunlight is essential to the welfare of the patient and the hygiene of its surroundings.

ASTHMA (BRONCHIAL).

True asthma is by no means common, if one excepts the dog. Where the paroxysms are very severe, the writer has found considerable relief derived from hypodermic injections of morphia et atropine. Others have recorded good results from the use of amyl nitrite, arsenic, caffeine, digitalis, and belladonnæ. As these attacks in the horse often come on while at work or exercise, the animal should, of course, be unharnessed and allowed to rest, and a light, easily digested, concentrated diet ordered. Fusty hay, kiln-dried oats, frosted roots or grass must be excluded. This treatment will tend also to prevent a recurrence. Care should be taken that the animal is not permitted to do heavy straining work after a full meal. The manger food should be mixed with boiled linseed, and it is better that the animal should be watered half an hour before, than immediately after, feeding.

Hoare recommends the following for the horse:

℞ Fluid Extracti Belladonnæ Potassii Iodidi	āā ʒx.
Liquoris Arsenicalis	℥x.
Glycerini	℥iv.
Aquæ	q.s. ad O.ii.

M. Ft. mist. One wineglass twice daily in food or water.

Gray recommends the following for the dog:

℞ Syrupi Apomorphinæ Syrupi Ipecacuanhæ Syrupi Scillæ	āā ℥ii.

M. Ft. mist. One to two teaspoonfuls three times daily.

ATRESIA ANI ET RECTI. *See* Diseases of Anus and Rectum.

AURICULAR ACARIASIS (OTACARIASIS).

The otodentals can only be destroyed by the careful application of suitable dressings. The accumulation of wax scales and scab material in the meatus act as natural protectors to the parasite; it is therefore advisable at the outset to pour a little warm almond oil into the aural canal, manipulating the base of the ear between the finger and thumb, so that the oil may permeate all the debris, which is then easily removed by means of a blunt pair of forceps, round the end of which is wound a pledget of cotton-wool. The aural canal is straightened out by pulling the ear flap outwards and slightly forward. In this way, if the case is a chronic one, it is astonishing what an amount of material may be removed. The forceps are passed in close up to the drum, care being taken, of course, not to pierce that organ. When the canal has been thoroughly cleansed, the following dressing is advised:

℞	Ichthyol Acidi Borici	āā grs. xxx.
	Glycerini	ʒii.
	Olei Olivæ	℥ii.

M. Ft. lotio.

After warming and shaking thoroughly, a little of this dressing is dropped in the ear daily.

Alternate dressings consist of the insertion of bougies, similar to those recommended in cases of canker.

AVIAN DISEASES.

Apoplectiform Septicæmia in Chicks.—Norgaard isolated a hæmolytic streptococcus from birds affected with this disease, and carried out immunization by injecting into the wing vein 0·5 to 2·5 c.c. of bouillon culture of the organism which had been sterilized, and the results appeared to be highly satisfactory.

Asthenia in chicks is due to a bacillus of the colon group. The affected should be removed from the healthy, and coops, runs, etc., disinfected. Dawson recommends giving each diseased bird a teaspoonful of castor oil or $\frac{1}{4}$ grain of calomel, followed by powdered fennel, anise, cinchona, and later by pepsin and bismuth.

Bronchitis.—Healthy surroundings are essential, also medicated inhalations, and such agents as eucalyptus, terebine, or creosote. Zürn recommends the internal administration of ammonium chloride and honey, each 0·5 gramme; fennel water, 50 grammes; the dose being a teaspoonful to a tablespoonful three times daily (Gray).

Cholera.—When this scourge makes its presence felt, the healthy as well as the diseased should be inoculated with an immune anti-cholera serum, and repeated in eight to ten days.

Prophylactic measures consist of vaccinating each bird with the *B. avisepticus* once a week, three injections in all being given. The diseased should be separated from the healthy, the runs disinfected, the dead birds burned.

When the cost of vaccine treatment is a consideration, astringent antiseptics may be tried, such as sulphate of iron 1 to 100, aromatic sulphuric acid 1 to 200, the dose being one to two teaspoonfuls in drinking water twice daily. Lime water may also be added to drinking water.

A suspended solution of china clay, recently advocated for bacterial intestinal infection in human medicine (*vide Lancet*, August 5, 1921), might also be serviceable in fowl cholera.

Constipation.—Where there is an accumulation of fæcal material, its removal by finger or a blunt probe is advised, and a soapy enema given. Matted feathers, if present, should be removed by scissors, an oily laxative, such as a teaspoonful of medicinal paraffin or castor oil, given, and a laxative diet ordered, such as bran and oatmeal, with plenty of green food—lettuce, cabbage, swedes, etc.

Crop Diseases—*Catarrh and Inflammation of the Mucosæ.*—As the organ is usually distended with fermenting ingesta, this should be removed by massaging the crop and pressing the contents towards the mouth, the head hanging downwards. The bird should then be given a teaspoonful of medicinal paraffin, and the following given night and morning: Bismuth subnitrate, 1 grain; sodium bicarbonate, 3 grains; and no food be allowed for twenty-four hours, after which soft food for three or four days.

Indigestion.—In this condition there is also mechanical obstruction due to atony of the crop wall, to overcome which massage is recommended, and the bird placed on a course of dilute hydrochloric acid 1 part, infusion of quassia 100 parts (weak), the dose being one teaspoonful three times a day, and later 1 to 2 grains of ingluvin should be given. Where the crop still remains impacted, it may safely be operated on, the accumulation removed, and the wound sutured in the ordinary way.

Subsequent treatment consists of feeding sparingly for the next few days on soft food largely composed of bran.

Diphtheria.—This is probably the most important disease affecting poultry from a mortality and economic point of view. When the disease breaks out, careful nursing and the judicious application of antiseptics are called for, and the affected should be isolated. Where the disease takes on a localized phase, careful removal without damage to the underlying structures of the false membrane is indicated, and the daily dressing of the part with a fine brush dipped in a solution of perchloride of mercury 1 to 2,000.

Internally Zürn recommends the following:

℞	Acidi Salicylici	grs. vii.
	Potassii Chloratum	ʒii.ss.
	Glycerinum	ʒvi.
	Spiritus Vinum Rectificatus	ʒiv.
	Decoctum Juglans	℥v.

M. Ft. mist. One teaspoonful night and morning.

When intestinal complications manifest themselves, sulphate of iron may give relief.

On the other hand, in many outbreaks it may be considered, especially in the initial stage of an outbreak, advisable to kill off the affected, remove the healthy, and completely disinfect the run, etc.

The segregated birds should be examined daily for the existence of false membranes for at least a month after isolation.

Fowl Pox.—Treatment is identical with that for diphtheria, except that in addition the local application of equal parts of tincture of iodine and glycerine appears to exercise an almost specific action.

" Gapes."—Caused by the parasite *Syngamus trachealis*, this disease often gives considerable trouble in pheasantries and poultry runs. Infusion of garlic in the food has been recommended by some authorities, and so also asafœtida. Others advise fumigation with sulphurous acid, camphor vapour, tobacco. Another common practice by laymen is to remove all the barbules except at the tip from a feather, which is introduced into the trachea, giving two or three turns, thereby dislodging the worms. Care is here required, however, owing to the danger of suffocation. The feather may also be dipped in vaseline and passed along the glottis and withdrawn. Preventive measures, which should be vigorously carried out, comprise isolation of the affected birds, burning dead birds, removal of the healthy to fresh runs, thorough disinfection of contaminated runs by sprinkling them with salt and lime, and keeping the birds from the run for an extended period. Finally, the drinking water should be pure and fresh. (See also Parasitic Diseases.)

Gastro-Intestinal Catarrh.—In this condition diarrhœa is a more or less constant symptom, to counteract which a teaspoonful of castor oil or medicinal paraffin should be given, followed by 1 grain of sulphate of iron; 1 grain of bismuth and 2 to 3 minims of tincture of opium is usually effectual if given two or three times a day. The food should be well-cooked rice and white bread; in addition, some authorities recommend minced onions.

Nasal Catarrh, Simple.—It is advisable to remove the diseased bird or birds from the healthy. The discharge should be removed, also crusts, if present, and the nostrils irrigated once or twice daily with a 1 per cent. of proflavine in normal saline solution. An aperient, castor oil, or medicinal paraffin, should also be given.

Nasal Catarrh, Specific (Roup).—This is a highly contagious disease, entailing rigid isolation for its eradication. The diseased birds should be comfortably housed and kept warm. Gray recommends that the eyes and nostrils should be freed from the discharge by sponging two or three times a day with a warm solution of permanganate of potash, or creolin 1 per cent., or 1 to 1,000 perchloride of mercury, and the internal administration of strychnine, $\frac{1}{32}$ grain; quinine sulphate, $\frac{1}{2}$ grain; powdered capsici, 1 grain; ext. gentian, q.s. M. pil. Give one night and morning.

Pneumonia.—The bird must be placed in airy and roomy surroundings, and a small dose of castor oil administered at the outset. A useful mixture is composed of solution of acetate of ammonia, potassium iodide, and chloroform water, or a course of aspirin or salicylate of soda may be tried.

Stomatitis, Catarrhal.—The hygienic surroundings should be improved. The new growth or growths on mouth and tongue should be carefully removed and dressed with a mild antiseptic. Law recommends dressing with iodized glycerine or salicylate of sodium and glycerine. The writer has found 5 per cent. each of tannic and boric acid dissolved in glycerine answers well.

Stomatitis, Parasitic.—The mouth should be painted with a 10 per cent. solution of boric acid or peroxide of hydrogen (Hoare).

Turkey Entero-Hepatitis, Infective.—When this disease breaks out in a flock, the healthy should be separated from the diseased, the buildings and ground thoroughly disinfected, and the birds removed to completely fresh runs. The diseased as well as the healthy should each have one to two teaspoonfuls of medicinal paraffin, and a course of intestinal antiseptics (such as salol, creosote, carbolic acid, β-naphthol, sulphate of iron, proflavine) should be administered to eliminate the amœba. The runs, even after disinfection, may remain infective for a year. In severe outbreaks it is often sounder economy to kill off all the birds and give up breeding in the same area for a couple of years (Moore).

AZOTURIA.

Many views are held and expressed regarding the etiology of azoturia. Probably the auto-intoxication theory is the nearest to the truth, the toxins being derived from an excessive development of bacteria in the alimentary tract through some disturbance in the metabolism, largely aggravated by errors in diet. The system, therefore, being surcharged with bacterial toxins and metabolic by-products, our duty clearly consists in administering eliminatives, and of these turpentine is to be preferred, as it is also antizymotic. Further, one requires an agent possessing rapid diffusibility, and turpentine can be smelt in the breath and detected in the urine half an hour or less after administration. A dose of aloes with 1 ounce of aromatic spirits of ammonia should be given in liquid form, not as a ball, at the outset, and the animal placed, where possible, in a comfortable loose-box, chosen with the idea that slinging may be necessary later on. The body must be well rubbed, as the animal is usually in a bath of perspiration, rugged, and the legs bandaged. Where possible, a fresh sheepskin placed across the loins is advised. The writer has obtained excellent results by injecting ½ to 1 gallon of normal saline solution subcutaneously, to which 2 ounces brandy is added. If the patient is very restless and likely to go down, he should be slung forthwith. Enemas always assist in hastening the process of elimination. If the subject is full-blooded and the pulse bounding, he should be freely bled from the jugular vein. The following makes a useful prescription:

℞ Camphoræ .. .. ʒii.
Chlorali Hydrati .. .. ℥ss.
Olei Terebinthinæ .. .. ℥ii.
M. Ft. haust.

To be given every five hours in a pint of new milk or flax gruel; also ½ ounce each of nitrate of potash and sulphate of soda should be prescribed night and morning in the drinking water. Gentle exercise may be allowed after the acute stage has passed. The body should be well groomed with a stiff brush, the muscles of loins and quarters hand-massaged, and a stimulating liniment applied after the removal of the sheepskin.

BALANITIS.

Inflammation of the prepuce and glans penis is essentially the result of accumulation of dirt and debris in that region, and by reason of the anatomical arrangement of the penis and sheath the horse is the most common sufferer. The first necessary treatment consists of softening and removing the sebaceous deposits by the application of hot water and soft soap, after which the part is irrigated with a mild antiseptic, and the penis and sheath lubricated daily with weak carbolized oil. When the sheath is much swollen scarification should be carried out, the parts bathed with salt and water, and an astringent lotion, such as lotio albus, applied, the patient given daily exercise and a dose of aloes administered. In some cases it may be necessary to give support to the penis and sheath by means of a suspensory bandage.

BANDAGES.

The bandages in common use are made of calico, cotton, or tarlatan, and they vary from ½ inch to 3 inches wide, and from 1 yard to several yards in length. Poroplastic bandages are made of felt soaked in a resinous solution. By placing them in boiling water they become flexible, and can then be firmly applied, their porous character facilitating the egress of perspired elements from the skin. Elastic bandages are sometimes used to support the tendons of hunters and race-horses, and are excellent for this purpose. Care must be taken, however, in applying these bandages, that they are not too tight, otherwise more harm than good will follow. Simple as it may seem, there is considerable art in applying a bandage. In every case equalized pressure must be aimed at. In bandaging a limb, it is always wise to begin at the distal extremity and work upwards. Where a rounded joint like the fetlock has to be dealt with, bandaging in figure-of-eight fashion gives the best results. Bandages are used to give support to joints, tendons, and bones; they also serve to keep medicated dressings *in situ* over wounds. In the case of fractures, permanent fixed bandage dressings are obtained by the use of starch, plaster of Paris, glue, silicate of potash, pitch, etc., and these may be supported by splints of wood, cardboard, stout leather, tin, etc., if necessary. In using starch, the bandage is wound together somewhat loosely, immersed in the starch dressing, which by means of squeezing permeates the whole substance of the bandage. It must be remembered that starch bandages take a long time to set, and to prevent displacement during the setting process it is good practice, if the case is one of fracture, to fix temporary splints—wood, leather, or metal—over the bandage, and allow them to remain for twenty-four hours, after which time they may be removed. When plaster of Paris is used it must be fresh. The bandage is spread upon a table, and the plaster sprinkled thickly and evenly over it; it is then rolled, immersed in water, and, when soaked through, wound round the limb. Glue is melted and spread with a brush on the outstretched bandage, which is then wound, care being taken that the dressing is on the outside. Silicate of potash bandages have been used in the writer's practice almost exclusively during the last fifteen years, with excellent results. All that is necessary is to soak the bandage before use in the solution. If the animal's skin is delicate and tender, a thin, non-medicated bandage should be applied first; in this way any irritation which the dressing may cause to the skin is obviated. The dressing sets fairly quickly, and, when once set, becomes as hard as wood. Pitch dressings are more suitable for parts where circular bandaging is impossible. Ordinary Swedish or Burgundy pitch is melted in a pan, and, when melted, to every pound of pitch the writer uses 1 ounce each of powdered resin and common soap, the object of the latter being to give the pitch the necessary elasticity and to prevent brittleness. The whole should be well stirred and allowed to cool, when it is ready for use. In melting the pitch, care must be taken that it is not over-cooked, in which case it loses its plasticity and is spoilt. When sufficiently cool, it is placed on the skin with a flat stick or spatula, strips of bandages or thin layers of tow being applied, over which more pitch is added, and so on until the necessary support is obtained. The pitch must not be put on the skin too hot, or it will act as an irritant, causing the hair to shed *en masse* in seven to ten days, in which case the plaster may fall off long before the full term of necessary support has expired.

BEDSORES.

The prevention of bedsores and not their cure must be the primary aim of every surgeon. In all cases of decubitus due to debilitating diseases, spinal injuries, or paralysis much can be done to prevent pressure wounds from developing. In the case of the horse slinging is called for, but here, too, it must be remembered bedsores may occur in slings, especially if these are badly fitted or badly adjusted. The sores usually occur in animals unable to stand for a length of time, and are situated in the region of angles and prominences, such as the elbow, the knee, fetlock, sternum, hock, and external angles of the ilium. To prevent these from forming, the animal must be turned two or three times daily, the bedding made as soft as possible; if the animal inclines to move about the box, the floor should first be covered with sand, sawdust, or moss litter, and then with an abundance of short straw or hay bedding. The angles may be covered with tow or cotton-wool, and kept in place where practicable with bandages. This procedure will often prevent sores. In the case of the knees, knee-caps should at once be ordered. In addition, the skin can be hardened by painting methylated spirit on the angles and joints, and then dusting with fine borax. It is most important to prevent the patient from lying on its own excreta, especially urine; a sloping floor and good drainage are therefore essential. Where a sore has already formed, it must be treated as an ordinary wound. If there is a dead slough, hot fomentations are indicated; and when the slough is removed, an astringent lotion, such as lotio albus, to keep down granulation is advised. Ointments composed of boric acid, zinc oxide, and iodoform are also useful at this stage. It must not be forgotten that sometimes generalized septicæmia follows upon bedsores, and this is indicative of gross neglect on the part of the owner or bad surgery on the part of the attendant practitioner. When this unfortunate sequel sets in, it must be treated accordingly.

BEE STING.

Cases have occurred where animals have disturbed wasps' nests or beehives, with the result that they have been badly stung. In very severe cases the animal swells all over the body, and dies from suffocation and shock before help is forthcoming. In mild cases the stung area should be well washed with strong ammonia. As an emergency treatment or first aid, a saturated solution of washing soda or bicarbonate of soda brings considerable relief by neutralizing the poison. Peppermint oil or chloroform also relieve the irritation. Where collapse is feared, such stimulants as ammonia, brandy, whisky, coffee are indicated, as also hypodermic injections of strychnine. Where suffocation is threatened, tracheotomy should be performed.

BIER'S TREATMENT (HYPERÆMIA).

In 1892 Bier introduced the artificial production of hyperæmia as a method of local treatment, the object being to increase an already existing hyperæmia, and so flush the infected area with an excess of antimicrobic and antitoxic sera, and also to increase cellular activity. Further, where there are structural defects, reparative processes are stimulated by the increased quantity of blood going to the injured parts. Bier attained these objects by three methods:

1. Elastic compression, passive or venous.
2. Dry cupping, mainly passive.
3. Heated air, active or arterial.

The first method in veterinary practice is the most satisfactory, both in its application and results, and need be the only one discussed here. A Martin's elastic bandage is the best, but a compress may be improvised out of a piece of rubber piping, and the writer has on several occasions used ordinary broad elastic. A tourniquet will also answer one's purpose. When rubber piping is used, owing to its "cutting" tendencies, it is advisable to apply a thin porous bandage to the skin first, over which the tubing should be bound. Bier's treatment, of course, can only be applied to the limbs, head, and tail, and it must be noted very carefully that the compress is put on lightly enough to produce venous stasis only. *Arterial compression must be avoided.* This can only be judged by feeling pulsation in the artery at a point distant to the compress, but where œdema, for example, is so great that the pulse cannot be detected, it is best to be guided by the animal's comfort. If it is applied so tightly to the limb as to produce arterial stasis, the patient will persist in pawing, or even lie down as in colic, and this is particularly noticeable in blood horses. It is difficult to dogmatize upon the length of time a compress should be kept on, as each individual case must be a law unto itself. Speaking generally, however, the writer has found that to keep the compress one to two hours on and three to five hours off answers the purpose. The treatment serves so many purposes that practitioners can be almost empirical in applying it. Thus we have found it of considerable benefit in obscure lameness, in wounds at the coronet, pricks in the foot, sprained tendons, periostitis, open joint, in the early stages of navicular disease, in sesamoiditis, septic infection (local) in the limbs and head, after firing; line or pyro-puncture. In severe sprains and diseases affecting the joints we sometimes make an additional practice of applying a compress for five to ten hours, thereby getting the patient back to work much sooner. In cases of open wounds it is astonishing to see the amount of lymph which flushes through in twenty-four hours under the treatment, and, where a dead slough or much sepsis is suspected, this flow is increased by putting the foot or limb in a bath of very hot water, dissolved in which are 4 ounces each of citrate of soda and common salt, repeating this daily. Quittors have greatly improved under this treatment, and also cases of laminitis after the hoofs have been opened.

BILE DUCT, CATARRH OF.

Catarrh of the bile duct may be acute or chronic, and has been seen in most animals. It is, however, doubtful if the condition has ever been diagnosed as an independent disease, hepatic and duodenal complications being usually found in addition. A cathartic should be given, followed by small doses of calomel, and in the case of the dog and cat hydrargyrum cum creta proves very useful. An emetic also administered in the early stages often gives relief. Salicylate of soda and chloride of ammonia are each serviceable in rendering the bile more liquid, and acting as an intestinal antiseptic. In small animals massage over the hepatic region tends to disperse accumulated bile. In cattle practice, sulphate of sodium combined with treacle is excellent.

The diet in all cases should be light and non-stimulating.

BILHARZIOSIS VEL SCHISTOSOMIASIS.

If not severely infected, animals usually recover if provided with a liberal diet and transferred from infected places. Tonics in the shape of iron salts may be prescribed. The intravenous injection of solutions of tartar emetic has met with considerable success in human medicine (Christopherson).

The disease, being conveyed by infected cercariæ, is met with in marshy places. Those should be drained or avoided.—*G. K. Walker.*

BILIOUSNESS.

Torpidity of the liver is often seen in pampered and overfed dogs, stall-fattened cattle, and sheep fed on rich starchy food such as maize. The liver in these cases being in a persistent state of mild congestion, low diet and increased exercise are essential. The bowels are always sluggish, and an increase of peristalsis should be induced by the administration of occasional doses of such drugs as calomel, podophyllin, or aloes. In the horse a brisk purgative of aloes is advised, in the ox or sheep a dose of Glauber or Epsom salts, and in the dog a calomel and podophyllin pill overnight, followed by a saline in the morning, often has the desired effect. Subsequent treatment consists of giving nitro-hydrochloric acid and infusion of quassia night and morning.

BLACK-QUARTER.

The curative treatment for black-quarter is most unsatisfactory. In several cases, when called in during the early stages, the writer has tried deep scarification of the diseased area, irrigating the resulting wounds with permanganate of potash solution, combined with subcutaneous transfusion of the parts with the same solution, internal administration of carbolic acid and strong coffee, intravenous injection of normal saline solution and proflavine, all without satisfactory results. The best means whereby we, as professional advisers, can be of any service to our clients is by the use of *prophylactic* measures—*i.e.*, artificial active immunization. Where the outbreak is a severe one, vaccination by the *double* method should be carried out; if mild, single vaccination for economic reasons answers one's purpose. The writer prefers the string vaccine, and always makes a point of inserting it under the skin of the tail. By this method he has done many thousands without a single mishap. It may be pointed out, however, that by inoculating in this region a *less attenuated vaccine* than the strength usually supplied commercially is recommended. Further, complete immunization takes longer to become established than when the vaccine is inserted under the skin of the shoulder. On farms where one or two calves are lost yearly from black-quarter, it is false economy for the owner to wait until the disease breaks out before introducing prophylactic measures. It is sound practice to inoculate calves on breeding farms every six months—viz., in the early spring and in the early autumn.

The foregoing remarks only apply to prevention. Curative measures have been adopted from time to time by practitioners, some claiming good results from the early use of peroxide of hydrogen injected into and around the emphysematous swelling. It appears to the writer, however, that the intravenous injection of immune anti-sera is the only rational line of treatment one should adopt, but the case must be attended to in the early stages before advanced auto-intoxication has taken place.

BLADDER, DISEASES OF.

Atony.—This condition is not so common in veterinary as in human medicine. It has been observed in old horses (especially stallions) and old dogs. It is also seen in cases of mechanical obstruction to the flow of urine due to prolonged distension and undue strain upon the muscular element of the bladder. Treatment consists of the removal of the cause and the subsequent toning up of the bladder wall by the administration of the following:

For horse and ox:

℞ Pulveris Nucis Vomicæ Quininæ Sulphatis	āā ʒii.
Pulveris Ergotæ	℥ss.

M. Ft. pulv. One powder night and morning in food or draught.

For dog:

℞ Extracti Nucis Vomicæ	gr. $\frac{1}{10}$
Extracti Ergotiæ	grs. iv.
Tincturæ Cantharidini	♏iii.
Aquæ	ʒi.

M. Ft. haust. One teaspoonful night and morning.

Where the obstruction to the flow of urine is more or less constant, regular catheterization may be called for.

Distension.—This condition may be temporary or permanent, and is seen in obstructive conditions preventing the flow of urine, in prostatic diseases and urethral calculi, also in paraplegia and such conditions as tetanus, where the animal has difficulty in placing itself in a position to urinate. In all such cases the urine must be removed, for the bladder wall can only stand a given amount of internal pressure, going beyond which means rupture and death. The writer has seen valuable animals lost, especially bulls, through this condition being overlooked and curative measures delayed. Catheterization is here indicated, failing which the bladder should be tapped (see Puncture).

Hæmorrhage.—This may occur in the bladder itself from irritation set up by the presence of calculi, or to cystitis caused by the direct irritation of such drugs as cantharides, or the prolonged use of turpentine, particularly if it is impure. Further, it may be secondary to important specific diseases. When the hæmorrhage arises from the bladder direct, the cause must be ascertained and, where possible, removed, after which the injection into the bladder of astringent antiseptics, such as tannic acid dissolved in weak alum water, to which a few drops of adrenalin may be added, often gives relief. In severe cases the hypodermic injection of ergotine is advised.

Inflammation.—Cystitis may be due to the presence of rough-surfaced calculi, irritating drugs, bacteria; in the latter case, particularly in the female, by reason of the anatomical disposition of the organs, idiopathic inflammation and specific infections are by no means rare. In the case of the presence of calculi, these must be removed, and in doing so care must be taken to cause as little irritation as possible; abrasion or laceration of the mucosæ may lead to septic poisoning and death. Where irritating drugs are the cause, the nature of these must be ascertained and their effects neutralized by antidotes. The bacteria most commonly present in cystitis are *B. coli*, streptococci, and staphylococci. In all cases of cystitis the patient should have an abundance of barley and flax gruel, and the irritation reduced by the daily irrigation of eucaine hydrochloride, 6 grains, and potassium permanganate, 2 grains, to a pint of warm boiled water, and the following administered:*

Horse and ox:

℞ Extracti Hyoscyami	ʒii.
Pulveris Sodii Bicarbonatis	℥ii.

M. Ft. pulv. One to be given every five hours in a pint of flax gruel.

Dog:

℞ Extracti Hyoscyami	grs. v.
Pulveris Potassii Bicarbonatis	grs. x.

M. Ft. pulv. One to be given every six hours in barley gruel.

Oil of sandalwood may be given with advantage with the above prescriptions, or alone in doses, for the horse and ox, of 2 to 3 drams; and for the dog, 5 to 10 minims. When the cystitis is due to bacilluria, the species of organism should be ascertained. In the case of *B. coli* infection, urotropine is the best agent in 2-dram doses for the horse and ox, and 10-grain doses for the dog, combined with hyoscyamus extract, and followed up later with full doses of sodium bicarbonate or citrate of potash. In the case of streptococcal and staphylococcal invasion, salicylate of sodium, boric acid and oil of sandalwood are among the best drugs for administration, whilst warm irrigations of boro-glycerine should be given daily. In using these injections through the catheter, the following points should be observed: (1) The solution must be at blood heat; (2) the bladder must be emptied of urine before injection; (3) the medicated injection must not be too strong; (4) the bladder must not be too over-distended with the injection solution; (5) the injection should be drained off in fifteen to twenty minutes afterwards. When the above medicaments fail to bring about relief, the following may be tried in rotation:

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* By reason of the sigmoid flexure in the penis of the ox it is almost impossible to irrigate the bladder unless urethrotomy is performed, and in practice this is not always commendable.

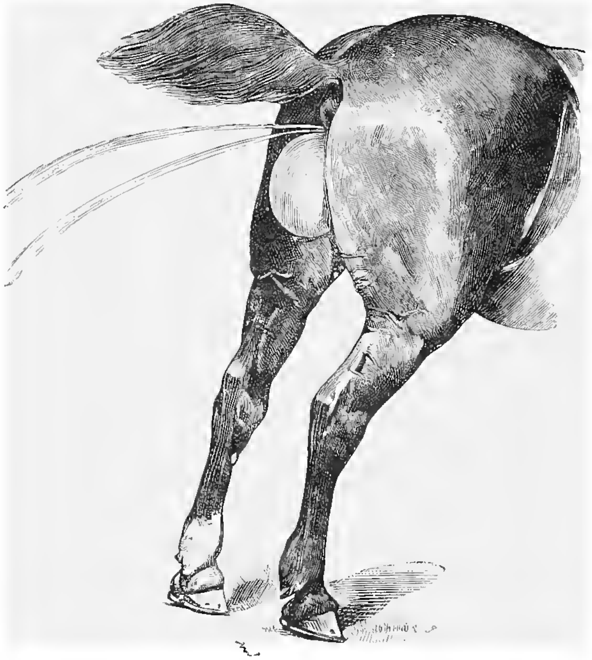

Fig. 15.—Inversion of the Bladder in a Mare.
(From Dollar's "Regional Surgery.")

Resorcin	1 dram to	20 ounces	water.
Protargol	,,	,,	,,
Lysol	,,	,,	,,
Argyrol	2 drams	,,	,,

In those cases which "hang fire," the writer can strongly recommend auto-vaccine therapy.

Inversion.—This condition can only occur in the female. It is most commonly met with in the mare and the cow, and as a sequel to ante- or post-parturition. The meatus may or may not be injured, but in any case there is a muscular relaxation, and, in addition, *excessive* straining. The sooner the surgeon sees the case the better. The animal, if a mare, should be twitched, and the tongue pulled out as far as possible, as this tends to prevent straining. If the rectum is loaded with fæces, it should be emptied. The vulva is then washed with soapy water and a mild antiseptic. The bladder and vagina is smeared with carbolized oil, and by steady digital manipulation the organ replaced. Some authorities advise the use of a blunt piece of stick; this the writer considers a pernicious practice, and one fraught with much danger. Where a case of dystocia is being dealt with, before delivery can take place the bladder must be replaced, but the chances are that the animal's straining will invert it again. In these cases chloroform anæsthesia is called for, as obviously delivery cannot take place with the bladder resting on the vaginal floor. If the meatus is torn or greatly stretched, it may be considered advisable to insert a ligature. This is somewhat easily done with a curved needle and by using the vaginal speculum. Should the bladder mucosa be ulcerated, necrotic, deeply inflamed, or torn, amputation is the only hope. This is accomplished by using an elastic ligature, the organ sloughing away in a few days, leaving a healthy granulated stump; of course, care must be taken not to include the ureters in the ligature, and means must be adopted to prevent the ligature from riding forward on the ureters. Amputation means doing away with the urinary receptacle; hence the urine will dribble away afterwards, and in fine-skinned animals this tends to excoriate the skin, in which case the occasional application of vaseline or lard to the skin of the hips and legs will act as a varnish, and thereby tend to diminish this risk.

Irritability.—This condition is seen in cystitis, and as such it must be treated accordingly; but it also occurs in a mild and independent form, largely due to a hyper-acid condition of the urine, when a saline aperient followed by the administration of large doses of sodium bicarbonate are indicated.

Sabulous Deposits.—These are by no means uncommon, especially where animals habitually drink very hard water. The bladder in the female is emptied by using a long-handled, narrow spoon, after which the organ is irrigated with a mild antiseptic. In the male greater difficulty exists, urethrotomy having to be performed before attempt at removal takes place. In some cases which the writer has seen it has been almost impossible to break up the mass owing to its mortar-like consistency, and, further, the bladder mucosæ by a plastic cystitis has become adherent to the mass, adding to the difficulty of removal. These do not lend much hope for ultimate recovery.

BLEEDING. *See* **Hæmorrhage.**

BLISTERING. *See also* **Vesication.**

Blisters are primarily used as counter-irritants and absorbents, the active ingredients usually being cantharidin or cantharides and acetic acid or turpentine, biniodide of mercury or perchloride of mercury and hydrochloric acid. The drastic drug, croton oil, is very seldom used now. In the case of blistering horse's limbs, the hair is clipped off, and the part washed with soap and water, dried, and the blister rubbed in, fifteen minutes' rubbing being usually allowed for each leg; not more than two limbs are blistered at a time, and where all four legs require blistering, it is better to treat the near fore and off hind legs together, or *vice versa*, the other two legs being blistered in a week or ten days. Where flexible joints have to be blistered, such as the hock, knee, or heels, before blistering it is advisable to apply a little grease at the flexures first, care being taken that little or no blister touches the angles. After blistering, the patient must be tied up for twenty-four to forty-eight hours, or a cradle applied to prevent it biting the part. When dealing with young unbroken colts which cannot be tied up, if they are fasted for twelve hours, blistered in the evening, and turned out in a paddock after darkness has set in, they seldom or never bite the blistered skin. In a week or ten days a little carbolized vaseline or boro-vaseline should be applied to the skin, or, better still, carron oil—*i.e.*, equal parts of linseed oil and lime water.

BLOOD-LETTING.

Venesection has been practised from time immemorial, and the one great reason why in these latter days it has fallen into disrepute is that in the past it was practised indiscriminately for every type of disease. As it was over-applied then, we are of the opinion that it is under-applied now, for in suitable cases scientifically selected, rapid bleeding is such a powerful agent that chemotherapy cannot replace it. For example, in cases of acute congestion of the lungs, venesection relieves cardiac and pulmonary engorgement as no other agent can. In cases of lymphangitis, especially in plethoric horses, the patient gets sooner to work after bleeding, and so also in the acute stages of laminitis and pneumonia followed by the injection of normal saline solution. Venesection is usually performed at the jugular vein, and although the operation is quite a simple one, a certain amount of skill is required. If the animal is not clipped, the jugular furrow is damped to lay the hair. An attendant stands in front of the horse, raises and steadies the head, and covers the left eye with his right hand, the object being to prevent the animal from flinching when the blood-stick strikes the fleam. The operator stands at the left side of the patient, the fleam in the left hand and the blood-stick in the right. With the free fingers of the left hand the jugular vein is pressed a little higher up than the point equidistant between the entrance of the chest and the angle of the jaw. The point of the blade of the lancet is now placed upon the jugular vein, which has already been raised by finger-pressure, taking care it is situated absolutely in the central axis of the vessel. With the blood-stick in the right hand a sharp blow is dealt upon the fleam, when blood will flow freely. This should be collected to the amount of ½ to 1 gallon, the finger being retained in the vein all the time. If the flow is tardy, the insertion of the fingers in the mouth under the tongue makes the animal work its jaws, and in so doing hastens the blood-flow. When sufficient blood has been withdrawn, an ordinary pin is passed through the lips of the wound, round which in figure-of-eight fashion is wound horsehair, thread, or a strand of tow. In bleeding cattle the same procedure is adopted, except that here the vein is best raised by a rope placed low down on the neck and drawn tight by an attendant. In addition to the jugular, bleeding may be practised from any superficial vein. Thus the eye vein, the forearm vein, the mammary vein, and the thigh vein of the hind limb may all be opened, and these usually by a lancet. Pigs are often bled by cutting off the tail.

BLOOD POISONING. *See* **Septicæmia.**

BLOOD SPAVIN.

Although this condition is sometimes seen in practice, it is by no means common. Treatment here consists of ligature of the anterior branch of the saphena vein above and below the hock, as described in bog spavin, and the whole spavin painted with strong tincture of iodine daily for one week, or blistered with biniodide of mercury.

BLOODY FLUX. *See* **Dysentery.**

BLOWN. *See* **Tympany of the Rumen.**

BLUE TICK. *See* **Ticks, Control of.**

BLUE TONGUE, OR CATARRHAL FEVER OF SHEEP (SOUTH AFRICA).

A disease responsible in some years for great mortality amongst South African sheep. The malady is of a constitutional febrile nature, but the morbid appearances are confined chiefly to the upper air passages and oral cavity.

Of a paludal nature, and contracted at twilight or during the hours of darkness, there is no reasonable doubt that the disease is conveyed by a flying insect whose period of greatest activity coincides with these times of the day. Members of the Culicidæ family are strongly suspect, and the protective measures which are of proved efficiency are just such as serve to protect the sheep from attack by the mosquito.

Treatment of the individual case, where adopted, consists of removal of the sick animal from the flock, and placing it in a shed or in quiet and shady surroundings. Febrifuges and astringent mouth washes are of use where the temperature is elevated and the buccal membrane denuded of its epithelium. Where the feet participate in the inflammatory process, emollient and astringent dressings will help to shorten the period during which, while unable to stand, the sheep feeds from a kneeling position.

Washing the nostrils daily relieves the difficult and noisy breathing consequent on the accumulation of the mucous defluxion which forms so prominent a feature of the clinical disease course.

Soft green food will generally be eaten, and as the inflammatory symptoms commence to disappear the diet should be supplemented by a generous allowance of food of a more nutritious kind.

The individual case, however, rarely receives the care and time necessary to bestow upon it, and measures of prevention are of much greater importance to the flock-master than details of treatment.

The South African farmer has long recognized that the close folding of the flock at night in a kraal, or preferably in a shed, affords a considerable measure of protection during the sickly season. The close pungent atmosphere produced by this crowding upon a small space is deterrent to winged insects, the mosquito especially being intolerant of the presence of free ammonia in the air.

Frequently, however, kraaling or shedding is impracticable owing to distance or absence of buildings, and in such cases the preventive inoculation of the flock is imperative if the season threatens to be a bad one.

Two systems of preventive inoculation exist, one by the use of a "passage virus" obtained by passing the virus through a succession of sheep, the intensity or virulence of type becoming reduced by such transmission. This is the Theiler system of inoculation.

The other system, devised by Pitchford of Natal, consists in the defibrination of the sterile blood taken from typical severe cases, and its attenuation by heat for some time in an incubator regulated to maintain a temperature of some 15° F. above the normal.

Both these vaccines have given good results for a number of years, but in some localities and seasons the disease type appears, owing to some unrecognized cause, subject to variation, and in such cases the protective influence of the vaccine fails occasionally to be exerted.

Enormous saving of animal life, however, has been effected by the above preventive measures during the last twenty years, and the protection of a flock by such means at the commencement of each sickly season has become a routine measure adopted by many South African farmers, who would otherwise be obliged to give up sheep-farming owing to the heavy losses annually incurred from blue tongue in the unprotected flock.—*H. Watkins Pitchford.*

BOG SPAVIN.

This condition is very common in some districts in one to four year old colts running on rich pasture-land, particularly if they are in high condition. Lameness as a rule is absent in these cases. Thorough-pin as a joint condition is also sometimes present, and forms an unpleasant complication. For several years the writer has operated on those cases of bog spavin, as they constitute an unsoundness, in the following manner: The patient is cast on the affected leg, the limb freed from the rope or hobble, as the case may be, and firmly fixed by a rope attached to the fetlock to a crowbar which has been deeply driven into the ground. The skin over the hock is sterilized by iodized petrol after the removal of the hair, and also over the vein above and below the hock. An incision of the skin about an inch in length along the long axis of the vein (the anterior root of the internal saphena) just above the hock is then made, a tenaculum is inserted under the vein, raising it from its bed, threaded and withdrawn; the sterile thread now lying under the vein, the ends are drawn together and the vessel tightly ligatured; the edges of the skin are sutured with a single suture. A similar operation is now performed on the vein below the hock, but a double ligature is here inserted, and the vein severed between the two. The vein over the bog spavin will now be bulging, and it is here that an elliptical piece of skin from 1 inch to 2½ inches in length and ¼ inch in width at its widest is removed. All blood being removed from the wound, the cavity is mopped out with tincture of iodine, and a sterile needle attached to an aspirator is plunged through the hock capsule and the synovia aspirated. The wound is again painted with tincture of iodine, and the edges of the skin brought together with stout interrupted sutures, taking a wide hold of the skin to prevent premature tearing. Styptic colloid having been applied to the wound, the patient is allowed to get up, and is immediately turned out to grass, the sutures being removed in about a week. Further treatment is usually unnecessary, and in one to two months the cure is complete. In those cases where lameness is present, such treatment as above described is contra-indicated. Here the patient must be kept indoors to rest the joint. In the early stages hot fomentation, cooling lotion, and a dose of physic are indicated. Later, a biniodide of mercury cum sulphuric acid blister should be applied, and in some instances firing may have to be resorted to. In other cases where surgical interference is not sanctioned, considerable improvement has sometimes been obtained by painting the skin over the swelling daily with the following until signs of skin irritation are evident:

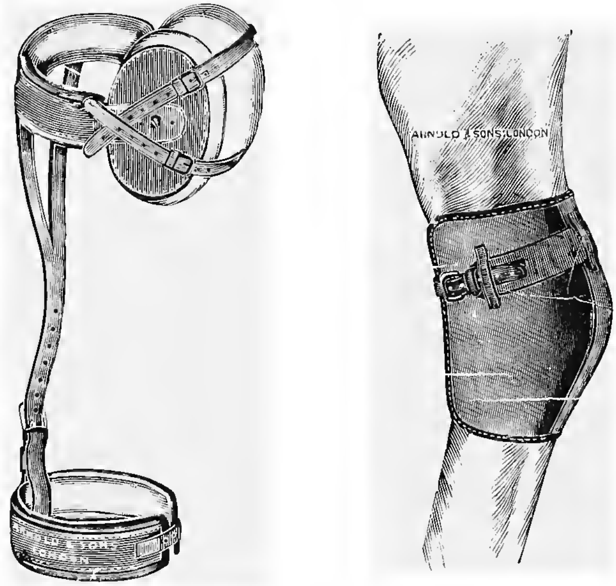

Fig. 16.—Bog Spavin and Hock Truss.

℞	Hydrargyri Perchloridi Acidi Hydrochlorici	āā ʒss.
	Spiritus Vini Meth.	℥ii.

M. Ft. spts.

This dressing being liable to blemish some skins more than others, it should be used discreetly, and only by an expert.

Finally, some cases are benefited by the application of a bog spavin truss or bandage.

BONE, DISEASES OF.

Necrosis.—Caries may follow periostitis, or may occur as the result of extensive direct injury to the periosteum. Here operative treatment is called for. The sinus must be probed to ascertain its extent and direction, the bone laid bare, and the wound made large enough to allow removal of the sequestrum. For this purpose it may be necessary to chisel or trephine the healthy bone. After removal the granulating cavity is scraped, all diseased bone and tissue removed, care being taken to search for and remove all pockets and sinuses. The whole cavity is then painted with tincture of iodine, and packed with gauze and bismuth paste.

Bismuth Carbonate	30 grammes.
White Wax	5 ,,
Soft Paraffin	5 ,,
Vaseline	60 ,,

This dressing is repeated every four or five days. It is satisfactory to note how quickly the wound heals under this treatment, which in the writer's hands has given exceedingly good results.

Periostitis.—This condition is seen most commonly in young growing horses, and affecting the metacarpal bone, more especially in race-horses and hunters. If the case is a mild one, complete rest, low diet, and a purgative should be prescribed, also hot fomentations, and the application of such soothing lotions as lotio albus and tincture of myrrh usually effects a cure.

In very acute cases, where the above treatment is of no avail, deep scarification through the skin and periosteum down to the bone shank under strict antiseptic conditions is advised. Subsequent treatment consists of douching the wounds three times daily with salt and hot water, and the application of boric lotion.

When the wounds are sufficiently healed, a biniodide of mercury blister and a long rest at grass usually completes the cure. In some cases due to injury the bone becomes extensively diseased, with a continual discharge of pus, and here curetting, packing the cavity with bismuth paste, and the injection of an autogenous vaccine are recommended.

Rachitis.—Rickets is due to the deficiency of earthy salts in the bone substance. All young animals are liable to become affected, but the disease is not so common as it used to be owing to the introduction of the principles of better management. The patient must have an abundance of good food, and as digestive derangement is usually associated with this disease, the diet selected must be light and digestible. In young animals the quality of the mother's milk is of the first importance; consequently, the dam should have an abundance of good food, and where the patient is old enough, in the case of the foal and the calf, bran and crushed oats should be given. For the puppy Glaxo is advised. Cod-liver oil and malt extract combined with mineral and vegetable tonics and lime water are also indicated.

The surroundings must be healthy, with an abundance of fresh air and sunlight, and moderate exercise allowed. Recently vitamins have been used in these cases, and are worthy of a trial.

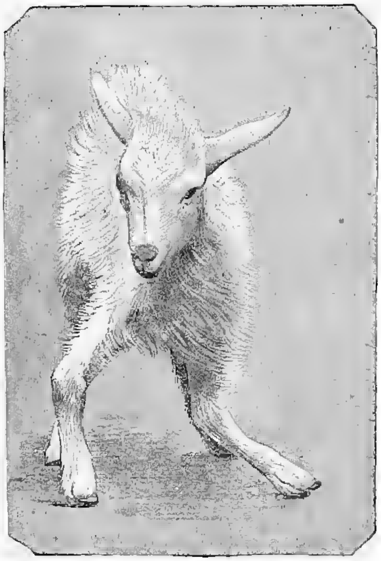

FIG. 17.—RACHITIS IN A YOUNG GOAT. (Moussu and Dollar.)

BONE SPAVIN.

The primary object of treatment for bone spavin consists in the removal of lameness. If the lameness is slight, and the owner is adverse to firing, a smart blister may be applied and absolute rest prescribed. If the animal is turned out and is of a restless disposition, treatment under these circumstances is greatly handicapped. It is better, therefore, to keep the patient in a large loose-box or open yard. The toe of the affected leg should be shortened as much as possible, and a high-heeled shoe put on. A useful blister is:

℞	Hydrargyri Iodidi Rubri } Hydrargyri Perchloridi }	āā ʒss.
	Acidi Hydrochlorici	♏xxx.
	Paraffini	℥ii.

M. Ft. ung. To be rubbed in for twenty minutes.

Where the lameness is pronounced, firing gives the best prospect of recovery, and this must be very thoroughly carried out. The writer uses a Pyrogene Dechery, and line-fires the hock deeply, both on the inside and outside, leaving the angle and cap of the joint intact. This completed, a puncture needle, if the exostosis is pronounced, should be thrust into the bone with considerable force, leaving it *in situ* for some seconds. Where the spavin is small or occult, insert the needle just under the skin, aiming at piercing the periosteum of the bone only, and withdrawing it again suddenly; two or three punctures usually sufficing.

If the needle passes in between the bones, most likely synovia will flow and may give trouble. After firing, a 1 in 8 biniodide of mercury blister is applied in a week or ten days. This blister should be repeated in about twenty-one days, and a high-heeled shoe put on. From one to three months' rest is usually necessary to effect ankylosis and subsequent recovery. Some authorities recommend periostotomy over the seat of spavin, and speak highly of it, and, where firing fails, this procedure is worthy of a trial. Neurectomy as a last resort is also advocated by some practitioners, but its utility is of doubtful service.

BOTRYOMYCOSIS.

This disease is the result of the development of the *Botryomyces ascoformans* upon the tissues, taking the form of a localized swelling, usually non-inflammatory in character. Whether the location is on the shoulder, presternum, withers, spermatic cord, or in the mamma, no practitioner should feel justified in adopting palliative measures, such as lancing the abscess formations, injecting tincture of iodine, or plugging with hydrargyrum perchloride. Radical surgical extirpation of the growth which carries infective foci, is called for. The animal should be cast and chloroformed. Where the lesion is found on the collar region, care must be taken not to injure in the process of dissection the jugular vein, or even the carotid artery; equal care must be taken, also, not to cut into the growth at the risk of contaminating the wound. Where the base is very diffused owing to inflammatory effusion, cooling lotion may be applied to the part for some days before operating. This defines the growth, makes operation easier, and leaves a smaller post-operative wound. If the disease is located in the mamma, it is best to remove the quarter or whole organ, the operator being prepared, of course, to adopt rigorous measures to arrest hæmorrhage (see Mammary Amputation). The same remarks apply equally to the disease where affecting the spermatic cord. The writer has experienced good results in some cases from the injection of autogenous vaccine, the pus most commonly containing *Botryomyces equi* and the usual bacteria found in secondary infection in abscess formations—staphylococci, streptococci.

Some authorities go so far as to suggest that, if *part* of the neoplasm is removed, the remainder will disappear. Needless to add, in the light of our present-day knowledge the adoption of such a method is contrary to all the principles of modern surgery, and should not be countenanced.

BRADYCARDIA.

The abnormal slowing of the pulse beat is often seen in old horses and dogs, in which case no treatment is indicated. Where it follows a severe attack of influenza, irregular strangles, or auto-infections cum intoxication, the actual cause of the cardiac depression is to be found in the bacterial toxins. Two classes of agents are here indicated—*i.e.*, eliminatives and cardiac tonics.

For the former, mild saline aperients and diuretics, followed by such agents as salicylate of soda combined with alcohol. For the latter, iron, strychnine, digitalis, caffeine.

BRAIN, DISEASES OF.

Concussion.—Where concussion exists without compression, the patient should be given a fair chance of recovery. If compression is present, our patients as a rule should be destroyed, for here trephining is usually necessary, followed by a long weary period of waiting treatment. When the case is one of concussion alone, the patient should be kept quiet, the head raised higher than the body, and ice bags applied to the poll. A full dose of physic should be given at the outset, and enemas administered, whilst the injection of normal saline solution is a useful adjuvant, acting as an eliminative agent, preventing cerebral clotting. If recovery follows, a long period of rest and quiet is necessary.

Congestion.—This condition may be due to arterial dilation of the vessels of the brain itself brought about by reflex action, or by mechanical pressure exerted upon the jugular vein by a badly fitting collar, by damming back the venous blood-supply, in which case the cause requires immediate removal. Treatment consists of lowering the blood-pressure by venesection, the application of cold water or ice bags to the poll, and the administration of a cathartic, of which calomel is the most valuable, followed by moderate doses of tincture of aconite and potassium bromide. The animal must be placed on low diet and kept absolutely quiet for several days.

Hæmorrhage.—See Apoplexy.

Inflammation.—If the condition is very acute and well established, particularly in the horse and the ox, treatment offers little hope of recovery. When the case is seen early and the animal found to be full-blooded, venesection should be practised and a cathartic administered—*i.e.*, aloin and calomel. In advanced cases, however, bleeding is not advised. The animal must be placed in a darkened, comfortable loose-box, and every effort should be made to prevent him from injuring himself; if he hangs his head, it should be kept raised with a double halter. Ice bags applied to the poll have a sedative action, but to obtain the maximum of benefit their application must be continued for a considerable time. The reduction of excitement must be enforced from the commencement by the administration of sodium bromide, which has given the writer better results than the corresponding potassium salt. When the acute stage has become reduced, mercury and iodine salts are necessary to absorb the effusion. In some cases the disease tends to become chronic, and the patient may then be looked upon as incurable.

BRAXY.

This disease is peculiar to the *ovine* species, and in certain districts accounts for serious losses. Curative treatment is of no avail. Prophylaxis consists of prescribing a less nutritious diet, moving the flock to non-contaminated pastures where possible, and deep burial or burning of dead animals. Vaccination, which has been carried out by Nielson, consisted of drying the kidney of an affected sheep, reducing it to a fine powder, which is then dissolved in a mild antiseptic and injected subcutaneously (Hutyra and Marek).

The Department of Agriculture, Ireland, carried out (by Mellon) a series of immunizations by administering *per os* 4 c.c. of virulent vaccine. The vaccine he obtained by collecting the peritoneal fluid in a pipette of an affected animal *just dead*, which he then incubated for twelve hours at 37° C. The contents of the pipette was then added to glucose broth under salad oil—all sterile, of course—and the temperature raised to 80° C. for twenty minutes in order to kill accidental non-sporulating germs. The media was then incubated for twenty-four hours. This constituting No. 1 vaccine. No. 2 vaccine was prepared in a similar manner by incubating for thirty-six hours. These vaccines must not be used after the third week in September (Hoare).

BRIGHT'S DISEASE. *See* Albuminuria.

BROKEN KNEES.

The varieties of broken knees usually found in practice are as follows: (*a*) The skin merely abraded; (*b*) the skin and extensor tendon lacerated; (*c*) the capsular ligament penetrated; (*d*) the carpal bones broken. In all cases where the animal falls on the hard road the wound must be looked upon as septic, this being due to the fact that the impact drives grit and debris, and with these bacteria, into the soft structures. Where the skin is only broken, efforts should be made to preserve the hair follicles, thereby reducing the risk of a permanent blemish. With this object in view, the knees are fomented with hot saline solution three times a day, after which the following ointment is applied:

℞ Acidi Borici }
Sodii Citratis } .. .. āā ʒii.
Unguenti Paraffini .. .. .. ℥ii.
M. Ft. ung.

This treatment increases the flow of lymph and prevents scab formation. The writer has always found, in treating broken knees, that if a scab is prevented from forming, or if, when formed, it is allowed to remain *in situ* for a short time only, the skin grows inward from the circumference of the wound, carrying with it young hair follicles, and by so doing the resultant baldness is reduced to a minimum. On the contrary, the ingrowing skin stops at the edge of the scab. Owing to its septic condition a knee wound should never be closed by sutures. Where the extensor tendon is lacerated, all torn shreds must be removed. This should be done with blunt-pointed curved scissors, the wound fomented, and ointment applied, as in the previous case; in addition, the patient is tied up to prevent lying down. Where granulations form, bulging out the wound and increasing the risk of permanent blemish, the whole wound must be daily cauterized with lunar caustic. If there is the least sign of constitutional disturbance, a physic ball should be ordered. Where open joint exists, treatment depends upon the stage it has reached when the practitioner is called to attend the case. If it is within two or three hours of the injury, provided there is no fracture of the carpal bones, much can be done. The leg should be immobilized by an improvised wooden or metal splint, the wound thoroughly irrigated by normal saline solution, and lightly curetted; the hose-pipe should then be allowed to spray on the part for an hour, after which the wound and joint is carefully painted with equal parts of oil of cloves and tincture of iodine, completely covered with bismuth paste, the whole joint enveloped in sterile cotton-wool, and lightly bandaged. To keep the latter in position, a knee-cap may be put on. This treatment is continued daily for a week or ten days, after which the synovial flow should cease. In cases where stiffening of the joint follows the throwing out of new tissues, massage, exercise, forcible bending of the joint, and repeated blisters may bring the animal back to work. Where the injury is very severe and neglected at the outset, treatment is inadvisable, and the patient should be destroyed.

BROKEN WIND. *See* **Emphysema (Pulmonary).**

BRONCHIAL ASTHMA. *See* **Asthma.**

BRONCHIECTASIS.

This disease is more common in the lower animals than many practitioners believe. In cattle with large tuberculous deposits situated in the lung parenchyma, in horses with metastatic pulmonary abscesses or in those cases following an acute attack of bronchial pneumonia, the bronchial walls become weakened, and a severe paroxysm of coughing often culminates in pronounced dilatation—*i.e.*, bronchiectasis. Removal of the cause very often gets rid of this tubular dilation in time, but in many cases, however, this is impossible. Where the condition is diagnosed during life, the general health and hygienic surroundings of the patient should be attended to. Internally creosote, oil of garlic, or guaiacol should be prescribed, while antiseptic medicated steam may be inhaled with benefit.

BRONCHITIS (ACUTE).

Two main objects must here exercise the mind of the medical attendant: (1) The limitation and relief of congestion of the bronchial mucosæ ; (2) the stimulation of the bronchial secretion. For the former, medicated inhalations, such as eucalyptus, tincture of benzene or creosote, the internal administration of vaso-dilators and diaphoretics, such as citrate of soda, aconite, wine of antimony, camphor. For the latter, ipecacuanha combined with potassium nitrate and tartar emetic are most beneficial. In the early stages counter-irritants to the chest are indicated; for this there is nothing better than superfine mustard mixed with vinegar, rubbed well into each side, and then covered with ordinary brown paper. If the cough is troublesome, small doses of belladonna are indicated, and where a stimulating expectorant is required, ammonium carbonate is excellent. When difficulty is experienced in drenching the patient, the drugs may be given where practicable in powder form on the tongue or as electuaries, or in food or in drinking water. The exciting causes may be climatic, the inhalation of irritating or obnoxious gases, or the inspiration of liquid during the act of drenching, but the actual *causæ causans* belong to the bacterial flora (see Pneumonia). It is evident, therefore, that vaccines must play an important part in the curative rôle (see Pneumonia). In this, as in all respiratory diseases, the drainage and general surroundings must leave nothing to be desired. The following prescriptions have given the writer good results in the *early stages :*

Horse and ox:

℞ Ipecacuanhæ Radicis
Antimonii Tartarati .. .. .. āā ʒi.
Camphoræ Flor.
Sodii Citratis .. .. ℥ii.
M. Ft. pulv. One three times a day.

Or—

℞ Tincturæ Aconiti B.P. .. .. .. ʒii.
Potassii Bicarbonatis
Sodii Citratis .. .. .. āā ℥ss.
Aquæ .. .. ad ℥ii.
M. Ft. haust. One wineglass three times a day.

Dog:

℞ Vini Ipecacuanhæ .. .. ♏x.
Spiritus Ammoniæ Aromatici .. .. ♏xx.
Aquæ Camphoræ .. .. ʒii.
M. Ft. haust. Two teaspoonfuls three times a day.

Or—

℞ Vini Ipecacuanhæ .. .. ♏x.
Liquoris Ammonii Acetatis Dil. .. .. ʒii.
Aquæ .. .. q.s. ad ʒii.
M. Ft. haust. Two teaspoonfuls three times a day.

An emetic of ipecacuanha wine or tartar emetic in the early stages may be given to the dog with much advantage, and the bowels regulated with medicinal paraffin.

Where the acute stage is somewhat advanced the following are recommended:

Horse and ox:

℞ Potassii Iodidi
Pulveris Digitalis Foliæ .. .. .. āā ʒii.
Ammonii Carbonatis .. .. .. ℥ss.
M. Ft. pulv. One to be given three times a day in a pint of linseed gruel.

Dog:

℞ Vini Ipecacuanhæ .. .. ♏x.
Tincturæ Scillæ .. .. ♏vi.
Aquæ .. .. ad ʒi.
M. Ft. haust. One teaspoonful three times a day.

Or—

℞ Apomorphinæ Hydrochloridi .. .. gr. $\frac{1}{12}$
Codeinæ .. .. gr. $\frac{1}{2}$
Vini Ipecacuanhæ .. .. ♏x.
Glycerini Aquæ .. .. ad ʒi.
M. Ft. haust. One teaspoonful three times a day.

Diet.—For all patients suffering from bronchitis the diet must be light and digestible. For the horse and ox, bran, oats, steamed hay, carrots, swedes, grass, etc. For the dog, milk, Glaxo, meat juice, gravies, soups, and later, tripe, sheep's paunch, chicken, fish, scraped mutton, etc.

BRONCHITIS (CHRONIC).

Fortunately this disease is less common in the lower animals than in man, and the reason for this is probably to be found in the fact that our patients' cycle of life is much shorter and their existence less artificial.

Vaccine Therapy.—If it is an accepted axiom that bacteria are the causative elements in acute bronchitis, it is very much more so in the chronic condition, and, further, vaccine therapy offers here even greater prospects of good results.[*] (See also Pneumonia.)

Chemotherapy.—Where the secretion is abundant, the cardiac and respiratory centres should be stimulated with digitalis and nux vomica. For the horse, a useful prescription is the following:

℞	Pulveris Digitalis Pulveris Nucis Vomicæ	āā ʒii.
	Potassii Nitratis	℥ii.

M. Ft. pulv. One to be given night and morning in food, or in a pint of warm water.

If the expectoration is scanty, potassium iodide is substituted for potassium nitrate, and when the cough is troublesome, extract of belladonna should be added.

For the dog:

℞	Potassii Iodidi	ʒii.ss.
	Ammonii Chloridi	ʒii.
	Heroinæ Hydrochloridi	grs. ii.ss.
	Aquæ Chloroformi	ad ℥ii.

M. Ft. mist. Give one teaspoonful every five hours.

The inhalation of steam medicated with eucalyptus, pine oil, or carbolic acid always proves useful.

BRONCHOCELE. *See* **Goitre.**

BRONCHO-PNEUMONIA. *See* **Pneumonia.**

BRUISES.

These may involve the hard or soft structures. When the skin is not broken, hot fomentations should be applied, followed by a cooling lotion such as lotio albus; and if there is much pain, a little tincture of opium or extract of belladonna may be added, the patient placed on low diet, and a dose of physic administered. Where there is extensive subcutaneous effusion, lancing at the most dependent point is indicated, with evacuation of the fluid and also blood-clot if the latter is present. The cavity must be well irrigated daily, care being taken to see that the wound does not close too rapidly.

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[*] *Vide* author's "Clinical Bacteriology and Vaccine Therapy."

BRUSHING.

This condition is most commonly seen in young roadster horses, and in the hind limbs. In many cases there is a pronounced hereditary predisposition. The writer had for some years under his observation a roadster stallion, and nearly all his progeny cut their fetlocks behind. If an animal brushes, it is almost always due to close conformation of the limbs; but it is also seen in young growing horses when overworked and out of condition, when the obvious remedy lies in giving rest and better food. Much can be done by suitable shoeing; the toe should be shortened, the inner wall rasped down as far as possible on the foot that causes the brushing, and a three-quarter shoe fitted. When the fetlock-joint is swollen and inflamed, rest is imperative, with the application of hot fomentations, and white lotion with tincture of arnica. The joint is then bandaged fairly tightly by a bandage soaked in vinegar, or continuous applications of cold water may be used. If this does not reduce the joint, a biniodide of mercury blister 1 to 8 should be applied, the shoes removed, and the patient given one to two months at grass. In some cases benefit is derived from the use of an elastic rubber ring placed round the leg above the fetlock-joint, or a boot may be applied.

BULL BURNT. *See* Vesicular Vaginitis.

BURNS AND SCALDS.

Burns may be caused by fire, boiling water, chemicals. Where the condition involves a limited area and the case is seen early, a saturated solution of bicarbonate of soda should be immediately applied, and later 1 to 200 solution of picric acid gives considerable relief and reduces the risk of blemish. The old-fashioned carron oil—equal parts of lime water and linseed oil—is strongly advocated by many; but when this preparation is used, boric acid 1 in 12 should be added. Where acids are the cause of burning, alkalies, such as sodium bicarbonate, must be immediately applied. If the burning is extensive, there is always the danger of shock, in which case alcohol, coffee, etc., are useful, also the subcutaneous injection of strychnine, caffeine, and normal saline solution. Where the wounds are very septic, and there is danger of septic intoxication or even septic infection, the sustained irrigation of solutions of hypochlorites or proflavine, and the internal administration of stimulants, combined with salicylic acid or aspirin, give the best results. Where deep, foul-smelling sloughs occur, hot saline fomentations, followed by the application of boric lotion, added to which are 2 ounces of peroxide of hydrogen to the pint of lotion, is advised. To hasten the removal of slough, a free use of the knife and curette is sometimes called for.

BURSATEE (PARASITIC GRANULOMATA, GRANULAR DERMATITIS).

Extirpation should be adopted wherever possible, great care being taken to remove all nodules (kunkur) and broken-down tissue. Where extirpation is not possible, as at the angle of the mouth, curetting and scraping must be resorted to. Further treatment consists in the application of dry dressings and agents to remove pruritus.

The application of iodoform to the scraped surfaces, covered by a layer of collodion and repeated daily, gives good results (Law). Holmes recommends the crystalline powder of red oxide of mercury on scraped surfaces. The compounds of mercury and arsenic may be used to cause sloughing of diseased parts and produce a healing surface below. Caution is required in using them.

The internal administration of arsenic and iodine (Donovan's solution) is advised.

General attention to the health of animals under treatment is necessary, and it is found that a change of environment, to a cool dry atmosphere, if possible, is likely to produce good results. It may be accepted that the disease is spread by flies at certain seasons of the year.

All abrasions should be protected carefully, especially in the rainy season, when flies are prevalent. The disease is found to recur in some animals during the rainy season. In such cases it is advisable to send them away from the plains.—*G. K. Walker.*

BURSITIS, OR BURSAL ENLARGEMENT.

Bursal enlargement may take place without evidence of an active bursitis; in fact, this is generally seen in practice. If the bursæ are inflamed, a purgative, low diet, hot fomentations, and the application of cooling lotion are called for. When the acute stage is reduced, strong tincture of iodine may be applied daily, and the leg bandaged if the condition is situated at the extremities, or perchloride of mercury may be applied as follows:

℞ Hydragyri Perchloridi	grs. xxx.
Acidi Hydrochlorici	♏xxx.
Spiritus Vini Methylatus	ʒii.

M. Ft. spts. Paint a little on carefully every two or three days.

This dressing must be used with discretion, especially in the case of fine-skinned horses, or death of the hair follicles will follow, leaving a blemish. When a scurf or scab has formed, the dressing should be discontinued for some days and vaseline applied. Finally, in other cases a biniodide of mercury blister 1 to 8 may be used, and the animal given a long rest.

Where there is a considerable accumulation of fluid, aspirating is advised under sterile precautions, and repeated if necessary; where pressure can be applied afterwards it should be used.—*G. K. Walker.*

CÆCUM.

Impaction.—As in all other forms of impaction, the first obvious desire of the practitioner, where such a condition is diagnosed, is the removal of the offending accumulation. This is obtained by softening the material through increasing the mucosal secretion and stimulating peristalsis. The patient must be made to drink an abundance of water, and this is best obtained by placing on the tongue a handful of common salt two or three times daily. Laxatives are to be preferred to purgatives. One and a half pints of linseed oil, 1 ounce carbonate of ammonia, and 2 to 3 drams of nux vomica, should be administered at the commencement, and repeated at intervals, if necessary substituting flax gruel for the oil. Hypodermic injections of strychnine and caffeine are also advised.

If the patient is in much pain, 2 drams camphor and 1 ounce chloral hydrate may be given at intervals, and also hypodermic injections of large doses of atropine. Cold-water enemas (which are best administered with a hose-pipe attached to a pressure water-pipe) often give good results. Needless to add, the patient must be prevented from rolling, and during convalescence kept on sloppy laxative diet, bran mashes, oatmeal, and steamed hay.

CÆSAREAN SECTION.

Hysterectomy in the mare and cow is a very serious operation if the primary object is to save the maternal life, and should only be undertaken when all other means fail to bring about delivery in the natural way; moreover, where parturition cannot be effected *per vaginam*, the practitioner should not undertake Cæsarean section as a last resort in those cases which are *in extremis* or where the patient has been severely handled by amateur accoucheurs unless the sole object is to save the offspring only. The animal having been cast on the left side and chloroformed, the hair is clipped in the region of the upper right flank, which is then washed with ether soap and antiseptic solution, dried, and painted several times with tincture of iodine. The surgeon, preferably wearing operating rubber gloves, then makes a horizontal incision through the skin to the extent of 12 to 15 inches; the muscles are next carefully cut through until the peritoneum is reached, all important bloodvessels being ligatured when cut across. The peritoneum is now carefully cut with a sharp-pointed bistoury, the edge of which, being directed outwards, prevents injury to the viscera. At this stage the bowels, if at all tympanitic (they usually are) will tend to force their way through the opening. An assistant, provided with rubber gloves, forces the bowels gently downwards towards the floor of the abdomen, while the operator lifts the gravid uterus upwards towards the parietal wound. A large sterilized cloth is now placed over the lower lip of the flank wound, and carried a few inches under the womb while that organ is being drawn towards the wound. This cloth should be so inserted that the bowel is prevented from protruding, and it also absorbs the fluids from the womb when opened, thus preventing these from entering the abdomen. The wall of the womb is now carefully cut, the right hand inserted, and the fœtus drawn out by the extremities. It may be necessary at this stage to fix a cord round the limbs to effect removal. A sterilized towel is now placed in the womb to absorb superfluous fluid. This done, the placenta is carefully removed—an easy matter in the mare, but sometimes troublesome in the cow. The wound in the womb is now closed with Lembert's sutures (see Sutures), *the edges* having been previously painted with tincture of iodine.* The flank wound is next sutured after painting with a weak solution of tincture of iodine, the peritoneum with fine catgut suture, the muscles with large-size kangaroo tendon, and the skin, along with half the depth of the muscle wall, with strong tacker, button, or quilled sutures. The whole wound is now covered with collodium, an antiseptic cotton compress placed over it, and kept in position by passing two sutures fixed in the skin. When the patient regains its feet, a stout sheet is placed round the abdomen and tightened by suturing over the loins. The pad and dressings should be removed in three to four days, and the wound redressed. In eight to ten days the tacker sutures should be removed. After the operation the patient is placed in healthy surroundings, and given a concentrated, light, digestible diet. In the case of the mare she should be kept tied up short for seven to ten days to prevent undue strain on the sutures. Cæsarean section in the smaller animals is carried out on the same principle, except that the gravid wound can be drawn through the parietal wound and opened external to the abdominal cavity, thus preventing the risk of infecting the peritoneum with uterine fluids, an important point when the latter is not sterile through the effects of prolonged labour and outside interference.

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* It is advisable to prevent the iodine from coming in contact with the peritoneum as much as possible.

CALCULI.

Calculi are found in various regions of the body, and require special treatment according to their situation.

Biliary Calculi, fortunately, are not commonly met with in veterinary practice; one can do little to expel or dissolve them, and their diagnosis is most difficult. Oleate of soda is stated to possess a solvent and expelling effect. When a gall-stone is passing along the duct, acute colic may be present. This should be treated with full doses of extract of belladonna or chloral hydras cum camphor.

Intestinal Calculus.—Save for the occurrence of intermittent attacks of colic, calculi do not give much trouble unless they get into such a position in the bowels as to prevent the free passage of ingesta or fæces, when they are a prolific cause of stoppage. If they are numerous and by their weight produce thinning of the intestinal wall, chronic irritation, chronic indigestion, and general unthriftiness are the invariable result. Surgical removal is the ideal procedure, but the results appear to be most discouraging, the probable reason being that the operation does not take place soon enough. The writer has operated in one case, and taken three calculi from the large colon, but the patient died on the fourth day. Others have recorded cases giving variable results. We can, therefore, only fall back upon treating the symptoms as they appear under the heading of colic and stoppage.

Salivary Calculus.—In this country calculi in the salivary ducts are by no means common. Where the calculus is small, every effort should be made by digital manipulation to force it into the mouth. If this fails, the only alternative is surgical removal. The animal should be cast, and a local anæsthetic injected into the site of operation. After shaving the hair the skin is sterilized with tincture of iodine, and an incision made from 1 to 2 inches long, according to the size of the stone, parallel with, and directly over, the long axis of the duct. The lips of the skin are kept open with retractors, and the connective tissue overlying the duct carefully dissected until it presents a clear outline. An incision (some authorities prefer the horizontal incision) is then made through the coats of the duct on to the stone, and removal effected. Obviously the smallest possible wound should be made in the duct wall, and if the stone is a large one, efforts are directed to split it before removal by the insertion of a gimlet or similar instrument. After removal, the cavity is thoroughly irrigated with a mild antiseptic, painted with tincture of iodine, and the duct wall carefully drawn together with catgut sutures. Finally, the skin edges are sutured and the whole wound covered with styptic colloid. If the operation has been performed under strict aseptic conditions, the wound will heal by first intention. If it suppurates, there is a possibility of a salivary fistula forming, which is usually troublesome to heal. After the operation the patient should be kept tied up by the head to prevent him from rubbing the wound. The diet should be sloppy, non-stimulating, and restricted.

Urethral Calculus.—The passage of a calculus from the bladder into the urethra is in any animal an important and serious condition, and usually demands immediate action, for as a rule such a passage is followed by the more or less complete retention of urine through obstruction. Should the stone completely block the lumen of the urethra, the time will come when the bladder is distended so much and the patient in the throes of colicky pains (especially in the case of the horse) that the vesicular walls will give way, death following. Having suspected the presence of a calculus, it should be located either by digital manipulation along the course of the urethra, both extra- and intrapelvic, or by passing the catheter, or both. In the horse, a usual seat for the calculus is in the neighbourhood of the ischiatic arch; in the ox, at the first sigmoid flexure of the penis (nearest the bladder). The horse should be placed in stocks, as the risk of casting with a distended bladder is very great, the skin painted with iodine and stretched over the calculus seat, and an incision made through the tissues down to the urethra; where the catheter can be passed, this should be done. If the stone is situated in the intrapelvic position, efforts should be made to force it into the bladder by digital manipulation through the rectum; failing this, the urethra should be opened at the ischiatic arch and the stone removed with calculus forceps. It is advisable to make as small a wound in the urethra as possible, and it is always better surgery to crush the stone and take it away in pieces (taking care not to unduly injure the parts) rather than effect its removal *en masse*, thereby necessitating a larger wound.

The after-treatment consists in keeping the wound clean, plaiting the hair of the tail, and occasionally irrigating the canal with a bland weak antiseptic. In the case of the ox, urethrotomy should be performed at the pelvic arch with the view of creating a permanent urinary outlet, and the animal fatted for the butcher. It is not always an easy matter to find the urethra in the steer. In the sheep, sediment accumulation behind the spiral filiform prolongation of the penis is not uncommon, especially when feeding on roots. Here the surgical removal of the spiral filament is indicated, and this gives immediate relief.

Vesical Calculi.—In the lower animals vesical calculi are very rare compared with those in man, the primary reason for this being possibly that the average life of animals is short compared with that of man. Treatment, to be of any value, must be purely surgical. Where vesical calculus has been diagnosed in the female, surgical removal is not difficult as a rule, unless the calculus has become adherent to the vesical mucosæ. In the larger animals, the mare, and the cow,* the size of the vaginal canal tends to simplify the operator's task. The rectum is emptied by giving a large enema, the vulva carefully disinfected, the right hand of the operator smeared with carbolized oil and passed into the vagina, the index finger being inserted into the bladder through the meatus urinarius. Sterilized calculus forceps are now guided along the finger into the bladder or a vaginal speculum may be inserted. If the calculus is large, it is advisable to stretch the sphincter by opening the forceps. The right hand is then passed forward over the bladder to grasp the body of that organ, and to guide the stone in between the blades of the forceps, which is now firmly grasped and removed. Should the stone be very large, it may be advisable to remove it in pieces after crushing. Removal of a vesical calculus in the male entails greater effort. The animal must be cast and chloroformed, the rectum having been previously emptied by an assistant. In the horse the catheter is passed in the usual way, the perineal skin sterilized, and at the pelvic arch an incision is made down to the catheter, which is then withdrawn. Through the urethral wound the sterilized forceps, previously soaked in carbolized oil, are passed into the bladder by the left hand, while the right hand acts as a guide in the rectum. Care must be taken not to use too much force when passing the forceps, for as a rule the sphincter is in a state of tense *tonic* contraction. When the instrument is in the bladder, the blades are well opened and the stone guided in between them with the right hand still in the rectum. If the stone is very large, crushing may be tried; if this fails and it cannot

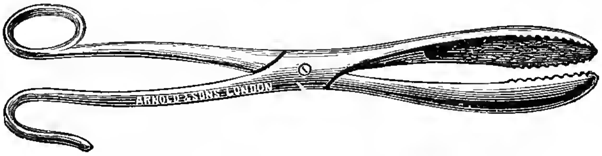

Fig. 18.—Lithotomy Forceps (Axe).

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* In entering the bladder of the cow the operator must always remember the presence of a cul-de-sac at the floor of the meatus (see Catheterization).

be removed, a long-bladed, semi-curved, blunt-pointed lancet should be carefully guided along the urethra to the meatus, and during its withdrawal the constrictor urethral muscle immediately behind the neck of the bladder incised on the *roof of the passage*, and preferably to the left of the median line. The forceps are then inserted and the stone grasped. Of course the greatest care should be taken not to include the vesical mucosæ with the forceps in addition to the stone, and, to avoid this, as soon as the stone has been grasped, the forceps are gently rotated, and, if found in a state of fixity, the operator should release his hold slightly upon the stone, when the mucous membrane will quickly recede. In exceptional cases, when the stone is so large as to prevent the forceps from clasping it, the only alternative, if the patient is a female, is to incise the urethral restrictor; then by steady manipulation and rotation the hand is passed into the bladder and the removal of the stone effected in this way.* Fortunately, this is not often required.

After-treatment in these cases consists of douching the bladder with normal saline solution in which is dissolved a weak percentage of permanganate of potash, and the urethral wound left to heal without suturing. In the case of the bull, catheterization being impossible by reason of the sigmoid curve of the penis, the surgeon has more difficulty in locating and cutting down upon the urethra. When once found and incised, a similar procedure is adopted as in the case of the horse. In the bull, vesical calculi are by no means rare, especially in pedigree stock which are kept in prime condition and living upon the richest food. These animals tend to possess a so-called *gouty diathesis* which probably predisposes them to calcareous formations.

CAMEL POX.

This disease is more commonly observed in young camels than in full-grown camels. The treatment of the disease will first be considered in young camels. The results obtained depend more on the nursing of the camels than on the administration of drugs. The disease has to run its course, and no drugs that we at present know of can cut it short; all that can be done is to assist Nature in effecting a cure. As soon as the disease makes its appearance, the mother and calf should be removed to a shady place and the mother tied up. If the mother is not tied up, but is allowed to wander about browsing, the calf will continue to follow her, and his strength will gradually be expended and he becomes exhausted and at length dies from weakness; whereas, if the mother is tied up in a shady place, the calf will remain with her and spend his time lying down and resting.

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* In some females the writer, after smearing the meatus with extract of belladonna, has succeeded in passing the hand into the bladder without cutting the sphincter muscle.

The swelling of the eyes and lips should be treated with tepid solutions of boric acid night and morning, and after the application the eyes and lips should be dried. Efforts should be made three or four times during the day to persuade the calf to suck; if the calf refuses to suck, the mother should be milked and the milk given to the calf as a drench, but too much milk must not be given to the calf at a time. If there is constipation, daily small doses of Epsom salts (3 ounces) should be given till the constipation is relieved. When the papules and crusts make their appearance, they should be washed with weak antiseptic solutions—*i.e.*:

Lysol	½ per cent.
Pot. Permanganate	5 ,,
Carbolic Acid	2 ,,
Chinosol	1 to 1,000

or dressed with antiseptic ointments such as boric ointment. Great care must be taken to avoid the lesions becoming fly-blown, and to effect this dusting the lesions with boro-iodoform or smearing with castor oil acts beneficially.

If the calf becomes very weak, stimulant treatment is indicated; 1 to 2 ounces of spiritus ætheris nitrosi may be given at intervals during the day. Other drugs that have a beneficial action on the course of the disease are ammoniated tincture of quinine in 1-ounce doses, and 1-ounce doses of hyposulphite of soda acts beneficially.

In the case of full-grown animals affected by the disease, swelling of the head, a few papules, constipation, and loss of appetite are the chief symptoms we have to attend to.

The camels should be taken to a shady place, but not tied down; water should be offered to them three times a day, and they should be tempted to eat by placing green fodder in front of them. The constipation must be relieved by the administration of Epsom salts in 1 to 1½ pounds. Hyposulphite of soda in 3-ounce doses may be given daily. Every endeavour should be made to persuade the camel to eat and drink by offering him green fodder or the branches of trees he has been accustomed to browse on, and by taking him frequently to water; on no account must the camel be forcibly made to eat, and the less the animal is "worried" the better.

Camels suffering from this disease must be protected from the sun, and if the nights are cold they must be "rugged up." If the camel is very weak and symptoms of prostration are manifest, stimulant treatment must be resorted to.—*H. E. Cross.*

CANADIAN HORSE POX.

As this disease is specifically contagious, treatment is both prophylactic and curative. All affected animals must be separated and isolated from the rest of the stock. The clothing, bandages, brushes, harness, partitions, mangers, posts, etc., must be thoroughly disinfected. The skin of the affected animals is dressed daily with antiseptic lotions, such as liquor carbonis detergens 1 ounce, acid. boric. 3 drams, water 20 ounces. When the acute stage has become reduced, soothing zinc ointment may be applied. Harness should not be used until the skin has gained its normal elasticity.

CANCER.

General Treatment.—The conditions under which veterinary surgeons are most often consulted in this disease are to be found in more or less circumscribed neoplasms situated in various regions of the body. The following principles should be observed: Early removal surgically is essential for a good recovery, and in doing this it is well to dissect into the adjacent healthy tissues, thereby increasing the assurance that all roots are removed. Adjacent lymphatic glands should be searched for and removed, particularly if they are enlarged. During the reparative processes no antiseptic of a specially irritating character should be used, as these tend to activate the cellular elements. Thus, coal-tar preparations are contra-indicated. For a similar reason sutures should be removed as early as possible.

Special Treatment.—Epithelioma are seen in horses, cattle, and dogs. A growth that resembles warts often, if neglected, becomes malignant, and thus early extirpation is demanded. In cattle the membrana nictitans is sometimes the seat of epithelioma. It begins as a small ulcer, on the floor of which are angry red granulations, which bleed on being touched. The eye appears "weak," and there is, as a rule, profuse lachrymation. The neoplasm, as a rule, grows rapidly, and in neglected cases invades the eyelid, the eyeball, and even the orbital socket and the adjacent bones, extending on to the brain itself. When the latter stages are reached, the smell is most offensive, especially in the summer months, and the case may be looked upon as hopeless. Where the membrana nictitans only is affected, the operation is a simple one. The animal is cast and a local anæsthetic injected, an eye speculum inserted, and a pair of forceps grasps the membrane, which is pulled forward as far as possible, and with a pair of curved, blunt-pointed scissors, inserted as far back as possible, the whole membrane removed. When the eyelids are involved, removal of the infected area is also carried out. If extension has taken place on to the eye itself, this organ must also be enucleated. If the bones surrounding the orbit are affected, thorough curetting and trephining may be practised, but when this stage is reached it is usually found more economical to have the patient destroyed.

Cancer of the Penis is by no means uncommon in horses and cattle. It may consist of small warty-looking growths superficially situated, or it may invade the parenchyma, necessitating in the latter case amputation (see Amputation of the Penis). In the former case the patient is cast and chloroformed, and each growth removed surgically and all bloodvessels ligatured. After-treatment consists of daily irrigation with a weak solution of sulphate of copper or perchloride of mercury. In some cases after removal there is a tendency to recurrence; for these cases in the stallion and bull the writer finds that castration often effects a complete cure. This operation appears to act by diminishing the flow of blood to the penis, and can be strongly recommended.

In some cases a complete cure takes place by castration alone.

[**Cancer of the Horn.**—The horn should be removed and the cancerous growth cauterized. Antiseptic dry dressings should then be applied. When there is extensive necrosis of bone, cases usually prove fatal.

The condition may be caused from pressure or chafing of head-ropes tied round the bases of the horns, and such should be avoided.—*G. K. Walker.*]

CANKER (DOG'S EAR).

This disease is most commonly met with in long-eared sporting dogs, and when seen by the practitioner is usually in an advanced stage. There is generally an accumulation of muco-purulent material in the aural canal and round the inner aspect of the concha, and this must be removed before treatment proper is adopted. Syringing the ear, as a rule, is not advocated, but where no other method can replace this procedure it must be carefully carried out. A short-nozzled sterile syringe of ½ ounce capacity filled with normal saline solution to which is added 10 grains of boracic acid should be gently forced into the canal. To straighten the canal the concha is pulled outwards and slightly forwards by an assistant. After injection, the base of the ear is manipulated between the finger and thumb in order to displace the pus and wax clinging to the wall of the meatus. The ear is then injected again. With a fine pledget of cotton-wool wound round the end of a small pair of forceps, all discharge and fluid is now carefully mopped up and removed. This should be very gently done, several pledgets being used in the process. If the pledget shows blood-staining, ulceration has most probably taken place, and a careful examination should be made with the ear speculum. As a result of the irritation set up by this disease, the dog more or less persistently shakes his head, striking his ears; hence an added complication is not uncommon—*i.e.*, a serous abscess of the concha. To prevent this, an ear-cap is applied during the irritating stage. The canal having been cleaned, medicinal application may be decided upon. If ulcers are present, these should be painted with a solution of silver nitrate, 3 grains to the ounce. Wallis Hoare recommends for chronic or neglected cases the following:

℞ Iodi	ʒii.
Glycerini	℥vi.

M. Ft. lini. This may be diluted with an equal amount of rose water, or used undiluted. Apply every third day.

Considerable benefit may also be derived from the following:

℞ Iodoformi Pulveris	grs. xxx.
Liquoris Carbonis Detergum	♏v.
Olei Olivæ	q.s. ad ℥ii.

M. Ft. lini. A few drops to be applied daily, after which the base of the ear is gently palpated between the finger and thumb.

Soluble ear bougies also give satisfactory results. These may be composed of boracic acid 2 grains, iodoform and tannic acid 2 grains each, or zinc sulphate $\frac{1}{4}$ grain, or ol. picis 2 minims, or ichthyol $\frac{1}{4}$ grain. Where there is great irritation the following bougie is useful: Morphia with cocaine each $\frac{1}{10}$ grain. These bougies are combined with glyco-gelatine as a base. They are cone-shaped, the pointed end being inserted into the ear and gently pressed home with a pair of forceps, the points of which should be covered with cotton-wool. The ear is then held for a few minutes to allow the bougie to melt and permeate the canal. It is needless to add that the general health of the patient should be attended to, and if necessary tonics administered. Dogs fond of water should be prevented from entering it for some time after the cure is complete.

CANKER (HORSE'S FOOT).

This is a very troublesome condition, exercising the patience and close attention of both practitioner and owner. All loose horn must be removed, and the foot thoroughly soaked in an antiseptic solution and then made perfectly clean and dry. The fungoid growths are now cut away and even scraped, if necessary. When all hæmorrhage has stopped, liquor ferri perchloridi is painted on the diseased parts and allowed to dry in, after which an equal part of spirits of tar and olive oil is applied. A drying powder of equal parts of boric acid and prepared chalk is then dusted over the surface, the sole of the foot is firmly plugged with pledgets of tow, and the shoe made with a leather sole fitted on. *Equable and firm pressure all over the diseased surface is most essential.* The wall of the hoof grows rapidly; this must be kept well pared down, so that the sole's surface may have even pressure on it when the animal bears its weight upon the ground. The lengthened application of any one kind of dressing or dressings loses effect. It is therefore advisable to change the procedure at intervals. A preparation supplied by Messrs. Willows and Company, and known as Davies' Canker Cure, is a most useful dressing in obstinate cases. It may be added, however, that it is not so much the dressings used as the method of their application. There is no disease which calls for more careful application than canker; hence it is that one practitioner obtains good results from a certain line of treatment, whilst another, using precisely the same method, fails.

The dressings should be changed every few days, and all decayed and spongy horn removed at intervals as required. Every effort must be made to keep the affected foot or feet as dry as possible.

CAPPED ELBOW.

Three distinct phases of this condition may be seen in practice: (1) A subacute, slightly painful, and diffused swelling; (2) a round, fluctuating, and non-painful swelling with a more or less pedunculated base, largely serous in character; (3) a round swelling showing a soft centre at its most dependent part, strongly suggestive of suppurative processes or ulceration going on. In each case the animal must be prevented from lying down. In phase No. 1 hot fomentations and astringent stimulating lotions are indicated. These will tend to reduce the size of the condition and leave a small circular fibrous growth, which can either be removed by dissection or by means of an elastic ligature, the latter process taking five to ten days to accomplish. After removal, the resultant wound should be treated with any astringent lotion to keep down granulations, and may be painted occasionally with tincture of iodine (double B.P. strength). In phase No. 2 the swelling may be lanced and the cavity painted with a 1 in 8 solution of hydrargyrum perchloride in spirit, and plugged lightly with carbolized tow, a smaller quantity of tow being renewed every two or three days and the animal kept standing. In phase No. 3 pus must be evacuated by lancing immediately, and the cavity touched up with finely powdered hydrargyrum perchloride and lightly plugged with tow. Subsequent treatment consists of irrigation with any mild antiseptic dressings. It may be added that cases completely removed seldom recur, and this is a strong recommendation for radical measures at the outset; while, on the other hand, cases of recurrence are met with where less severe treatment has been adopted. By many practitioners the heel of the shoe is held to be the cause of capped elbow; we believe, however, the shoe is blamed unreasonably in many instances, the hard bare floor being more often a prolific source of the trouble. This presumption, however, does not warrant neglect in having the heels shortened or even padded in animals liable to this condition. It cannot be gainsaid that some animals are more susceptible than others, and in these cases an elbow-pad should be prescribed. It is unnecessary to add that during treatment and for a considerable period afterwards the animal should be prevented from lying down.

CAPPED HOCK.

When seen in the inflammatory stage, a dose of physic should be ordered, and hot fomentations and cooling lotion applied to the part. To relieve tension, a high-heeled shoe is put on the foot of the affected leg and the animal tied up short. After a short time, if the swelling does not subside, a biniodide of mercury blister may be applied, and the animal tied up for fourteen days, or the following paint applied daily until the skin becomes tender, when it should be left off for a time and then again repeated:

℞ Hydrargyri Perchloridi .. .. .. ʒss.
Spiritus Vini Alcoholis .. .. .. ℥ii.
M. Ft. spts.

Where there is a persistence of serous fluid, this should be removed by the insertion of a small sterile needle into the sac, the fluid aspirated, and 30 minims of tincture of iodine in 60 minims of sterile water injected. The horse should be kept tied up for several days and then turned out to grass, the swelling gradually disappearing. Hock-caps may be used as a preventive.

CASTRATION.

Equines.—The uncomplicated castration of the foal, the yearling, or the matured stallion, must be classed among the minor surgical operations. Nevertheless, a good deal of manipulative dexterity and practice is required to operate successfully. Each practitioner entertains his own ideas as to the methods he uses and prefers. Thus, some still hold to the actual cautery, others to the torsion forceps, ecraseur, caustic clamps, and various forms of emasculators. Occasionally foals are castrated at a very early age, in which case it is most important that the practitioner should first assure himself that there is not the slightest suspicion of inguinal or scrotal hernia. If rupture should be present, the animal must be left alone for a time, unless there are signs of strangulation; for as the foal gets older the inguinal ring usually "tones up" and the rupture disappears. The foal makes a very good subject, and may be castrated by any of the recognized methods. In operating upon yearlings and two-year-old stallions, many practitioners prefer to do them standing, and certainly the method has gained in favour in this country during later years. It is not always easy to castrate a yearling colt standing, however, especially if it is backward in growth and in low condition, for it is often found in these cases that the testicle has not descended far enough to permit of its being grasped sufficiently to tighten the skin of the scrotum in order to facilitate cutting with the knife and liberation of the testicle. In castrating standing, the writer prefers to operate in an open yard, placing the animal adjacent to a wall. The scrotal skin is washed with an antiseptic, and, the twitch having been firmly applied, an attendant holds up the head with it, whilst with troublesome patients another attendant "picks" up the near fore foot. The operator grasps the cord above the testicle with the left hand and draws it downwards, thereby making the scrotal skin tense. With the castrating knife in the right hand, the scrotum

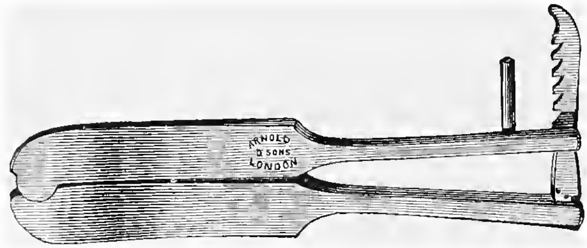

FIG. 19.—CASTRATING CLAMS.

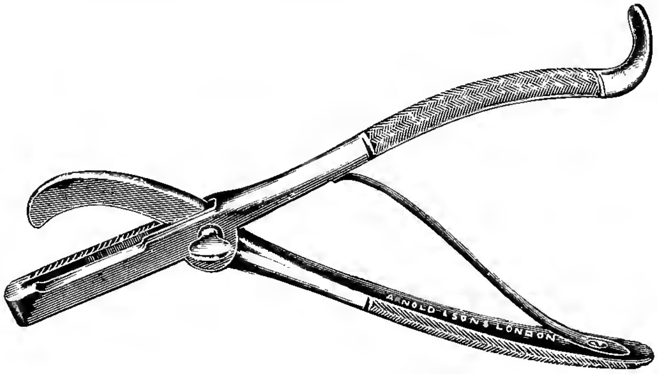

FIG. 20.—CASTRATOR (BLAKE'S).

and testicle are cut through with a bold incision and the testicle liberated. The organ may be removed with the ecraseur or the emasculator; in any case, it is always a good plan to do the crushing *slowly*, as excessive bleeding is less likely to occur. In some instances the animal may bleed for seven to twelve minutes, but this is usually of little account. Some operators prefer the use of the clamp. After liberation of the testicle, the wooden clamp is placed on the cord as high up as possible, the open ends of which are drawn together with strong forceps, tied with cord, and the testicle cut off with the knife. The great drawback to operating by this method is that the practitioner is called upon to make a second visit in order to remove the clamps. Many practitioners still prefer to cast their patients, and in the case of young, unbroken colts the side-line is generally used for casting. The animal should preferably be cast on his right side, and by drawing the uppermost hind leg forward up to the ring of the side-line the generative organs are freely exposed. Here, again, the *modus operandi* is that of the surgeon's own choosing.

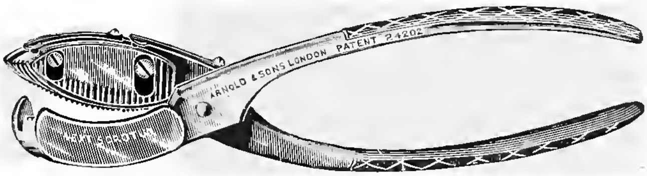

FIG. 21.—RELIANCE CASTRATOR.

Torsion.—The testicle having been exposed in the usual way, the cord is clasped by a pair of close-fitting metal clamps, and an inch or so from the clamps the torsion forceps are applied. With the left hand holding the clamps, the right hand rotates the forceps until the whole cord ruptures. Owing to the elasticity of the artery, this is the last portion to give way. The clamps are now opened, and the stump of the cord is allowed to withdraw itself into the scrotal sac; the remaining testicle is removed in a similar manner.

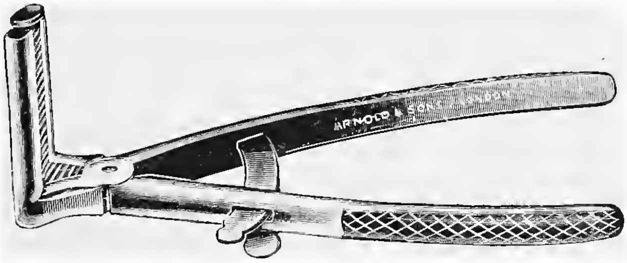

FIG. 22.—CASTRATING TORSION FORCEPS (ROBERTSON'S).

Crushing.—This is usually performed with the ecraseur or patent emasculators, of which there are many patterns on the market. By crushing the vascular and non-vascular portions of the cord, the resultant jagged end of the cord makes the arterial coats recoil upon themselves, thereby acting as a mechanical styptic. The writer's experience is in line with others who advise *slow crushing* of the cord, allowing plenty of time to elapse between each turn of the handle, thereby reducing post-operative hæmorrhage to a minimum. One other point that the operator must see to is that the chain is large enough, in the case of the ecraseur, to fill almost completely the slot through which it passes. If too much space is allowed, the artery will not be cut in the crushing process, but dragged through the slot in the chain, thus increasing the risk of hæmorrhage. In recent years the ecraseur has been largely supplanted by the emasculator, of which there are several kinds, their object being to crush the cord by serrated edges.

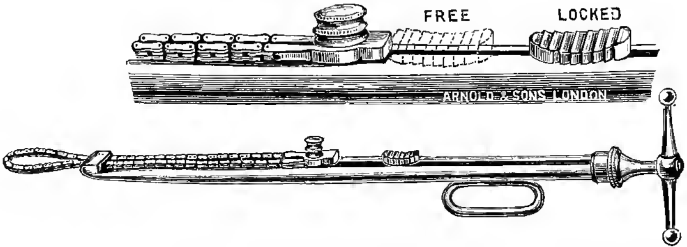

FIG. 23.—ECRASEUR (DEWAR'S).

Actual Cautery.—This barbarous method of castration is rightly becoming, in the light of present-day surgery, a thing of the past. A metal or wooden clamp is placed high up on the cord, the latter being severed with a knife ½ to 1 inch from the clamp, or it may be cut with the sharp edge of a hot iron. The stump is then seared, after which the clamp is slightly opened and closed, to note if any blood oozes from the stump, in which case the clamp is re-fixed and the stump again seared with the iron. The hot iron should have no scales on it, and to obviate this it is advisable to dip the iron in lard at intervals during the searing process. Again, the iron must not be too hot or too cold, or it will not act as a perfect styptic. The proper temperature can only be gauged by experience.

In castrating the other domestic animals, the same underlying principles are involved. In young lambs, calves, and pigs, the testicle is liberated, and the cord usually drawn upon till it snaps. Cats and puppies may also be operated on in this manner. Some practitioners prefer to scrape through the cord with a rough-edged knife. Bulls are usually castrated standing, and if un-ringed should be secured and restrained by a pair of bull-dogs. The emasculator is probably the best instrument here, and the writer prefers to twist the cord two or three times before adjusting the instrument; by this procedure hæmorrhage is less likely to follow.

CATARACT.

Removal of the lens in animals will never become so popular as in man, owing to our power of limitation to supply our patients with compensatory visual accommodation in the shape of glasses. One cannot, therefore, lightly recommend operation for cataract except as a last resort, and then only with the view of restoring a very limited degree of vision, or where the cataract is confined to one eye removal is advocated in the hope of saving the other eye. When the operation is decided upon, no half-measures should be carried out. Complete removal of the lens is advised. This is by no means so difficult an operation as it would appear. The instruments required are an eye speculum, a cataract knife, a cystotome, and a curette. In the case of the horse, the patient may be cast and chloroformed, or the operation done standing, after completely anæsthetizing the eye with cocaine, to which is added *atropine.* In the case of the dog, the patient is placed on the operating table, hobbled, and the head steadied by an assistant, and a local anæsthetic applied, to which *atropine* has been added in order *to dilate the pupil.* Prior to operation, the eyeball and eyelid are sterilized with weak, warm boric lotion. A few drops of the anæsthetic is then placed on the eyeball, and in the meantime the lids are pulled outwards, making a pocket of the conjunctiva, so that the whole organ comes in contact with the fluid. This is repeated at intervals till anæsthesia is complete. The instruments, having been boiled, are placed in a tray containing a weak solution of boric acid. The eye speculum having been carefully inserted, the cornea at its outer margin is pierced with the cataract knife, and the resultant wound slightly enlarged. Needless to add, the knife should not be inserted so far as to run the risk of damaging

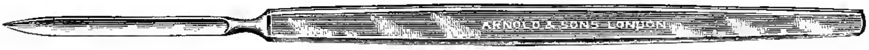

FIG. 24.—CATARACT KNIFE (GRAAFE'S).

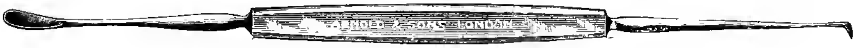

FIG. 25.—CYSTOTOME AND CURETTE (GRAAFE'S).

the intra-ocular elements, it being only necessary to pierce the corneal wall. From the wound will flow the fluid located in the anterior chamber (aqueous humour). The lens is now scraped *in situ* with a cystotome a few times, after which steady pressure to the eyeball is applied between the aseptic finger and thumb of the operator in such a way that the corneal wound is equidistant between the two. In this manner the lens is forced out. Sometimes, however, it has to be guided out of the corneal opening by a slightly curved cataract spoon. The operation completed, a little warm boric lotion is dropped into the eye. The after-treatment consists in keeping the patient quiet in a dark, or semi-dark, loose-box or kennel. Some authorities recommend the application of bandages and antiseptic pads on the eye. The writer has never found any bad result following the practice of leaving the eye uncovered, provided the following precautions are taken: The surroundings should be sprayed daily with an antiseptic, and the atmosphere rendered almost dustless. Weak boric lotion (warm) is applied to the lid and dropped into the eye with a sterilized dropper twice daily. This must be maintained for ten to fourteen days. In those cases of binocular cataracts it is advisable to operate on one eye at a time, which should be completely healed before the other eye is undertaken.

CATARRH (SIMPLE).

If the word is given its full pathological significance, which, briefly stated, is the active irritation of the surface of a mucous membrane and the consequent throwing out of sero-mucous fluid and cellular elements, then under this head a large variety of conditions must be discussed. In veterinary practice, however, the term is confined by many to a catarrhal condition of the nasal mucous membrane only, but a similar pathological condition may take place in laryngeal, pharyngeal, bronchial, gastro-intestinal, and bile-duct mucous membranes, all of which are of clinical importance, and therefore worthy of special and individual treatment.

Bronchial.—If the patient is seen in the early stages of bronchial catarrh, the attack can often be cut short. If this fails, bronchitis usually follows. As in all other respiratory affections, healthy surroundings are of the first importance, and as the bronchial mucosa is only a continuation of the skin, chilling of the latter must be guarded against by suitable body clothing, by bandaging, and the elimination of draughts. As it is not unusual to find in conjunction with this disorder catarrh of the gastro-intestinal mucosæ, a laxative is indicated—for the horse, linseed oil; for the dog, medicinal paraffin, or paraffin and malt, followed by full doses of salicylate of soda. The atmosphere of loose-box or kennel should be laden with volatile antiseptics—eucalyptus, benzoin, and coal-tar preparations; and as a moist atmosphere is less irritating than a dry one, boiling water is an excellent medium for volatilizing these drugs. The diet should be light and digestible.

Gastro-Intestinal.—Catarrh of the stomach and bowels is not uncommonly met with in the dog or cat, and is sometimes seen in the horse. The diet should be very light—in fact, it is best to withhold food altogether until the acute irritation has been reduced by such agents as bismuth combined with soda bicarbonate. It is always useful to give an oleaginous aperient at first. Later bran mashes and oatmeal may be allowed for the horse, and for the dog and cat chicken broth, and boiled skim milk to which lime water is added, may be allowed.

Laryngo-Pharyngeal.—A simple catarrh of the larynx seldom, if ever, exists as a separate condition, for one usually finds it associated with catarrh of the pharynx. The patient's surroundings must be healthy, with plenty of fresh air to the exclusion of draughts, the diet ordered being light and digestible, and the functions of the bowels attended to. In the case of the horse, a mustard plaster applied to the throat often cuts the condition short, whilst in the dog camphorated liniment may be used. Medicinal treatment is, as a rule, of secondary importance, and should be given either in the drinking water or in the form of an electuary. For the former, salines suit the horse best, such as potassium nitrate or potassium chlorate and magnesium sulphate or sodium sulphate. For the latter, the following is a useful electuary:

℞ Potassii Chloratis }
Acidi Borici } .. .. āā ʒii.
Pulveris Myrrhæ }
Syrups .. .. q.s.

M. Ft. electuaræ. One teaspoonful on the tongue several times daily.

Nasal.—This condition in itself is of slight importance, but if neglected is fraught with danger, sometimes leading to serious complications. It is therefore advisable to keep the patient indoors, and in cold weather properly clothed. The surroundings should be healthy and the diet light and digestible. The nostrils should be steamed, the steam being medicated with antiseptics, such as coal-tar preparations, pine oil, eucalyptus, Sanitas, or iodoform insufflations may be practised. Medicinally, a mild laxative is advised at the outset. For the horse a pint of linseed oil, for the ox 8 to 10 ounces of Glauber salts, and for the dog hydrargyrum cum creta 1 to 3 grains. Salines should be given in the food and drinking water—potassium nitrate, potassium chlorate, or sulphate of magnesia, and during convalescence, if the patient is run down, a course of vegetable and mineral tonics may be prescribed.

CATARRH (MALIGNANT).

This is an occasional affection attacking cattle, usually in the winter or early spring months. The profuse, grumous-looking, tenacious nasal discharge, swelling of the eyelids and vulva, combined with the chocolate discolorations of the skin of the muzzle, eyelids, and vulva, with subsequent cutaneous sloughing of those parts, indicates a disease apart in cattle pathology. Although the *causal* organism has not been isolated, the disease is undoubtedly microbial, and powerful toxins appear to be at work, as witness the fact that, among other things, there appears great prostration. The temperature, as a rule, is high and the bowels at first are constipated. Eliminatives and antizymotics are here indicated. The writer has obtained the best results by giving large doses of salicylic acid, 4 drams, carbolic acid 1 dram, in a quart of flax gruel, and six eggs two or three times a day. Half a pound of Glauber salts and 1 or 2 pounds of treacle should be administered at the commencement. If the animal is very prostrate, ammonium carbonate in ½-ounce doses may be given; also, the injection of ½ gallon (subcutaneously) of normal saline solution to which has been added 1 to 2 ounces of brandy acts as an excellent restorative, lowering the temperature and washing free toxins from the blood. The inhalation of steam medicated with coal-tar preparations, eucalyptus, turpentine, etc., hastens removal of discharge and relieves the tension of the mucosæ. Locally, the sloughing skin should be dressed with boracic ointment night and morning, after fomentation with saline solution. When the acute stage has been reduced, mineral and vegetable tonics are indicated—ferri sulphate, cinchonæ, nux vomica—and if diarrhœa is persistent, it must be checked by giving 2-dram doses of aromatic sulphuric acid night and morning in a quart of starch, rice, or arrowroot gruel. The patient's food, which at first should be light and laxative, and including eggs, gruel, milk, may be replaced by a more nutritious diet later. Where pronounced pulmonary, intestinal, or nephritic, complications set in, the issue is invariably fatal, and, *per contra*, where the case is treated early on the above lines and the animal is young and of robust constitution, a fair prospect of recovery may be anticipated.

CATHETERIZATION.

Horse.—In the male the usual difficulty is to withdraw the penis from the prepuce, but occasionally the operator is fortunate enough to lay hold of the penis when extended. If the patient is restless, he should be twitched and the fore leg picked up. The right hand is lubricated and passed into the prepuce, the practitioner standing on the right side of the patient. After grasping the penis, it should be firmly held, and by steady traction withdrawn. If great difficulty is experienced, inserting the finger or thumb in the glans penis hookwise gives the operator a good hold, and the pain, caused thereby, oddly appears to overcome resistance on the part of the animal. When the penis has been sufficiently withdrawn it may be necessary to secure it with a tape ligature; it is then an easy matter to pass the catheter, which has been previously lubricated with carbolized vaseline. On the catheter reaching the arch of the ischium, an assistant should be directed to press the end and guide it forward under the rectum. If the stilette is a very rigid one, when the arch is reached it is advisable to withdraw it a few inches, thereby making the catheter more flexible. When the catheter reaches the bladder, the stilette is entirely withdrawn, and the urine generally flows freely.

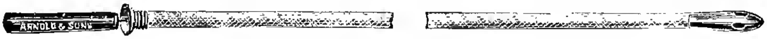

Fig. 26.—Horse Catheter.

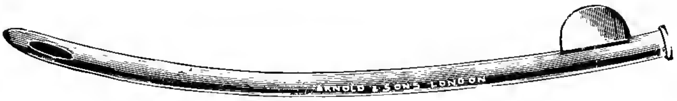

Fig. 27.—Bitch Catheter.

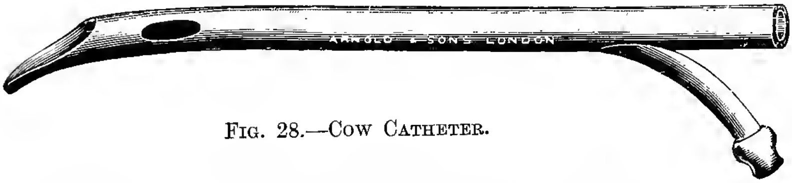

Fig. 28.—Cow Catheter.

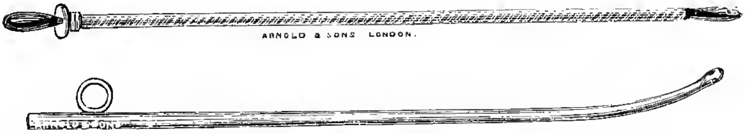

Fig. 29.—Mare Catheters.

Mare.—Passing the catheter in the mare is usually an easy matter. The catheter is made, as a rule, of pewter, gum elastic, or composition. The right hand is lubricated and passed into the vagina, on the floor of which, with the index finger, the meatus is located. The lubricated catheter is now inserted with the left hand, and the distal end guided into the urethral opening with the fingers of the right hand. Some mares are very sensitive to this operation, and, as the operator stands behind his patient, it is advisable to apply a twitch and to pick up the fore foot.

Male Bovine and Ovine.—Owing to the presence of the sigmoid flexure of the penis of the bull and steer, complete catheterization cannot be carried out in the usual way, and if the bladder has to be reached an artificial opening must be made at the pelvic end (urethrotomy), and the catheter introduced into the bladder through the wound thus made.

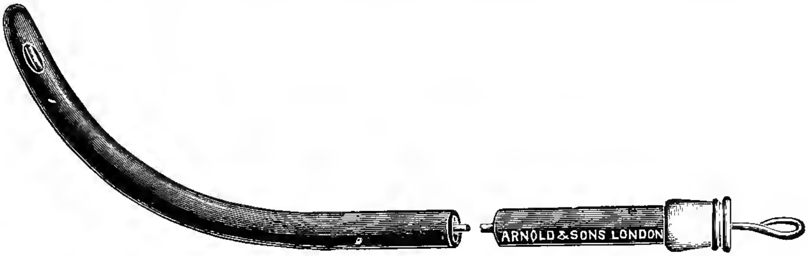

FIG. 30.—DOG CATHETER.

Cow.—The procedure adopted for the mare is carried out in the cow. If the index finger, however, is inserted into the meatus, invariably a cul-de-sac is reached, the true opening into the bladder lying above this pouch. If the flap which forms the floor of the pocket is lowered with the finger, the catheter can be passed into the bladder with ease. This is quite a simple procedure, but if the beginner is unacquainted with this anatomical arrangement, the use of the catheter may do irreparable damage.

Male Canine and Feline.—Very fine catheters only can be used here. Place the patient on his side. Gentle pressure exerted on the penis forces it from its sheath. The catheter is then inserted into the urethra and steadily forced over the pelvic arch until it reaches the bladder, when the stilette is withdrawn and the urine will flow.

Female Canine and Feline.—In the larger animals the index finger can be passed into the vagina, which acts as a guide to the catheter, or in both large and small patients a vaginal speculum may be inserted, and, the meatus having been located, the catheter is easily passed into the bladder.

In practising catheterization in all types of female animals, some surgeons, as a routine practice, use the vaginal speculum, and, needless to add, all catheters should be sterilized before use.

CELLULITIS, EPIZOOTIC. *See* **Influenza.**

CHOKING.

The lodgment of foreign bodies in the pharynx or œsophagus may occur in any of the domestic animals, but in practice the two species most commonly affected are probably the ox and the dog, the former being choked by roots and the latter by bones. The horse and the cat are, however, by no means immune. In the case of the horse and the ox, where the foreign body is lodged in the pharynx or upper cervical region, it is always good practice at first to endeavour to remove it by digital manipulation from without and within. A mouth-gag is inserted and the right hand of the operator passed into the mouth, whilst an assistant uses external pressure upon the object in order to drive it into the operator's hand. When the object is reached, it is not always easy to remove it. If it is a potato or a piece of turnip, the surface is covered with mucus and saliva, which makes it very slippery; in addition, there is the muscular spasmodic contraction of the pharynx to be overcome; lastly, there is the restless resentment of the patient, usually very pronounced in the horse. This restlessness, if great, should be overcome by casting the animal forthwith. Should digital manipulation fail to remove the object, the next alternative is to use the probang. A certain amount of skill and dexterity is required, which can only be attained by practice. The beginner should try his "prentice hand" upon the ox first. This animal, by reason of being a ruminant, has a larger pharyngeal and œsophageal capacity, and, further, he takes more kindly to the operation than the horse. In un-choking an ox, two attendants are usually required. One should be directed to grasp the left horn, or ear if a dehorned animal, with the left hand, while the right hand is reached forward to clasp the right upper cheek. The other assistant should take up his position on the opposite side, grasping the right horn or ear with the right hand, whilst the left hand lays hold of the left upper cheek. In this manner the head is kept at a proper angle, and, above all, a certain degree of fixity is attained. This fixing of the head may also be obtained by the use of a pair of bull-dogs. The operator now stands in front of the patient, and having seen that his probang is well lubricated with lard, vaseline, or oil, the distal end is guided along the *roof* of the palate until it reaches the pharynx, at which point the animal should be given time to cultivate attempts at swallowing it. This reflex act on the part of the patient should not be hastened by the surgeon using too much force. The probang having entered the gullet, steady pressure must be applied until the obstructing body is reached. A considerable degree of resistance is usually noticed here, demanding great care and manipulative dexterity on the part of the operator. Upon no account must extreme force be used, as the probang is then liable to slip and pierce the œsophageal wall. On the contrary, steady pressure is indicated to overcome the muscular spasm, and as a rule, when the first move has been made, the rest is comparatively easy. As soon as the probang reaches the stomach, the stilette is withdrawn, when an escape of gas follows. In some cases the practitioner is called in after the "handy-man" has made vain attempts to give relief, and in the meantime irreparable damage has often been done. In these cases it is always advisable to make a point of ascertaining the extent of the injury first. Passing the probang to the seat of obstruction and then withdrawing it usually reveals blood-clot or blood tinges on the instrument, and the owner should be informed accordingly. The writer strongly commends this preliminary to the young practitioner, to safeguard his own interests. If the animal is very tympanitic, the rumen should be tapped before attempting to pass the probang. Some practitioners before passing the probang insert a wooden gag or mouth-gag into the mouth, and to the inexperienced this procedure is commended, for if the instrument gets on to the molars it is liable to become damaged. After unchoking, a pint of linseed oil and 2 drams of boric acid should be given, and the animal allowed water *ad lib.*, *but it must on no account have any dry food or roots for twenty-four hours.* Un-choking the horse is a more delicate feat than un-choking the ox. Here we have to contend with anatomical difficulties in the shape of a narrow pharyngeal and œsophageal lumen, which, of course, necessitates the using of a probang of smaller dimensions. Further, we have a more excitable animal naturally to deal with, who often resists all endeavours to give him relief. Where stocks are accessible, this difficulty is greatly reduced. If not, a twitch should be placed on the upper lip, and also one on each ear, the head thereby being fixed and

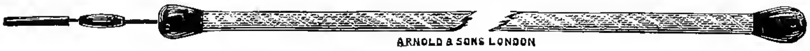

FIG. 31.—CALF PROBANG.

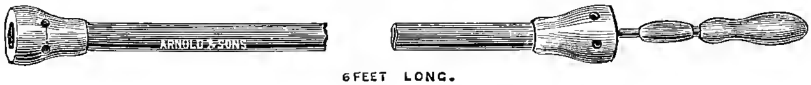

FIG. 32.—CATTLE PROBANG.

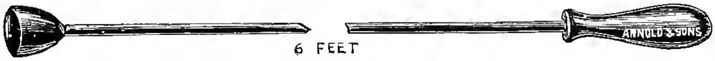

FIG. 33.—HORSE PROBANG. (Cane with horn mount.)

steadied. A mouth-gag is now inserted, and the head raised high enough to place it almost in a line with the long axis of the neck; the tongue is then withdrawn and the probang steadily passed along the roof of the mouth and into the gullet. The animal may be inclined to use his fore feet, and, as the operator is in front of his patient, he should make allowance for this. The same manipulative care shown in the case of the ox should be carried out here in dislodging the foreign body. If the patient resists all efforts to pass the probang, he should be cast, when the operation can usually be safely carried out. In all those cases where such food as chaff, oats, meals, etc., become impacted in the gullet, usually seen in greedy feeders who bolt their food rapidly, great difficulty is sometimes encountered. In cases where the lodgment is in the cervical region, ½ pint of oil should be given, and the mass kneaded from without with the hand before attempting to pass the probang. Some authorities recommend the injection of atropine and pilocarpine into the gullet at the seat of obstruction, the object being to relax muscular spasm and to increase the flow of saliva.

Should all means fail to remove the offending body, œsophagotomy must be performed if the obstruction is in the cervical region. The patient, unless very excitable, need not be cast. The obstruction having been located, the hair is shaved over the seat of operation, painted with iodine, and an injection of adrenalin with cocaine given. An incision is then made along the long axis of the neck about 3 to 5 inches long, depending upon the size of the obstruction. The muscles and connective tissues are parted. This is best done by the fingers and a blunt-pointed bistoury, taking care not to damage the carotid artery or jugular vein. When the gullet is reached, it should be drawn outwards either by a blunt hook or with the fingers, and attempts made to break down the obstruction. If this fails, an incision must be made along the long axis of the gullet over the foreign body, and the latter removed *en masse*, or in pieces. After operation the œsophagus is mopped out with carbolized oil, the lips painted with iodine, sutured, and dressed daily, and the patient kept upon milk, hay tea, linseed slops, etc., for several days, or preferably fed *per rectum*.

Foreign bodies in the pharynx and gullet of dogs are usually sharp pieces of bone, needles, wire, etc. Needless to add, the probang is worse than useless here. Attempts should be made to locate the body with the finger in the mouth, and when it is found it may be grasped by forceps and withdrawn. Sometimes the obstruction is fixed crossways, and needles may be found protruding under the skin, in which case it should be cut down upon, withdrawn, and the part treated as an ordinary wound.

CHOREA.

Chorea as it is applied in human medicine becomes in veterinary medicine somewhat a misnomer, and the nearest approach to it is only to be found in the dog. There can be hardly any doubt that the cause of chorea in the dog is autotoxic, the toxins—for there may be several—attaching themselves to the nerve elements in the larger centres, and if these radically alter or destroy the histological elements treatment can avail but little. The practitioner called in to treat chorea as a sequel to distemper usually finds his patient in a low condition, which demands the most careful nursing and sustained diet, which should be light and digestible, consisting of such foods as milk, Glaxo, fish, the white meat of chicken, scraped raw meat, tripe, Virol, etc. In cases following distemper hypnotics are contra-indicated; they mask the symptoms only, clog up the eliminative systems, and depress the patient. Certain it is, if any benefit from this line of treatment is to be derived it can be in the early stages and in extreme, acute cases only. If the bowels are constipated—and they often are—regular doses of medicinal paraffin are indicated. Five to ten grains of magnesium sulphate or sodium sulphate given daily is a safe and useful eliminative. Arsenic, combined with an alkali, is probably our most useful drug:

℞	Liquoris Arsenicalis	♏v.
	Sodii Bicarbonatis	grs. v.
	Aquæ	q.s. ad ℥ss.

M. Ft. haust. One tablespoonful three times a day after food.

This treatment should be followed up for a week, when the arsenic, after toleration takes place, may be increased. If the patient is anæmic, the following is advised:

℞	Liquoris Arsenicalis Tincturæ Ferri Perchloridi }	āā ʒiii.
	Aquæ Chloroformi	ad ℥iv.

M. Ft. mist. One teaspoonful three times a day after meals. Or monobromide of camphor 3 to 5 grains, or zinc sulphate 3 grains, may be tried.

If progress is not satisfactory under this treatment, 5-grain doses thrice daily of trional should be tried.* If these fail, the practitioner should look upon the case as one where organic mischief beyond complete repair has taken place in the nerve cells. If the convalescent stage should be reached, there is no better combination than the syrup of hypophos. co. in teaspoonful doses after food night and morning.

CHYLOUS ASCITES. *See* **Ascites.**

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* Some authorities speak highly of tartar emetic in 5-grain doses.

CIRRHOSIS OF THE LIVER.

This disease is not common in the lower animals, or, speaking more accurately, perhaps, is seldom diagnosed during life.

Where the condition is suspected, saline aperients are indicated; alternative doses of calomel may be advised, but potassium iodide perhaps exerts the most specific action.

COCCIDIOSIS.

In this country the animals usually affected are cattle and sheep, and where the disease is advanced the diarrhœa is profuse, and is invariably dysenteric. The affected animals have great thirst and show a pronounced predilection for dirty water, swamp water, excreta fluids, and the overflow from manure-heaps. As the disease is usually contracted from running over infected pastures, the affected animals should be brought indoors and fed on dry food, whilst the healthy stock are removed to fresh pastures. Many authorities recommend coal-tar preparations, iron, tannic acid, sulphuric acid, etc. The following has given the writer very good results:

℞	Thymolis	ʒvi.
	Camphoræ	ʒii.
	Olei Terebinthinæ	℥i.
	Mucilaginis Tragacanthæ	℥iii.

M. Ft. haust. To be given in a quart of milk or starch gruel night and morning.

One-quarter of the above dosage is suitable for the sheep. If the diarrhœa is persistent and profuse, aromatic sulphuric acid may be given with advantage. The patient should be restricted to drinking well-boiled flour gruel and milk, and the diet must be dry in character—hay, oats, bran, and pea meal.

Contaminated pastures should be freely dressed with soot, lime, salt, or nitrate of soda (see also Parasitic Diseases).

CŒNUROSIS.

This is commonly called "sturdy" or "gid" in sheep and cattle. With a better knowledge of the nature of this disease, prophylactic measures have been introduced, with the result that cases are fewer than in days gone by.

The means taken to ensure prevention are—(*a*) Restraining dogs from roaming at large over pasture-lands; (*b*) dosing them periodically to eliminate tapeworms from their intestines; (*c*) destroying all sheep and cattle heads which are suspected of harbouring the disease.

Curative measures are purely surgical, and then only when the cyst is located at or near the surface of the brain hemisphere, in which case the situation is detected by a thinning and softening of the cranial bones, easily discernible on manipulation. All that is necessary in these cases is to plunge a short sterile needle attached to a 10 c.c. syringe through the skin and bone, after sterilizing the former with tincture of iodine, and aspirate all the fluid or as much of it as possible. Where the cyst is deep-seated, no treatment is of any avail. If the cyst is located in the anterior bulbs of the brain, shepherds have been successful in tapping the cyst with a stocking-needle passed up the nostril and through the cribriform plate. Affected animals, if in good condition, should be slaughtered, as the flesh is quite fit for human food (see also Parasitic Diseases).

COLIC.

Colic in the broadest sense of the term includes a variety of conditions where the most prominent symptom is characteristic of abdominal pain, and this pain is consequent upon irritation of the abdominal viscera in some form or other. What is the cause of this irritation ? Although this work is not directly concerned with the *causes* of disease, yet before one can arrive at a rational method of treatment, the origin and nature of the irritant should be understood. Many authorities attribute colic to errors of diet, overwork, exposure to adverse influences, poisons, etc. Such views expressed by early writers answered their purpose admirably, but in the light of our present-day knowledge we must look more deeply into the subject. To mistake an *exciting* cause for an *actual* one is by no means an uncommon thing, either in human or veterinary medicine, and the writer ventures to think this is what has occurred in many diseases of the alimentary system. We must always remember that bacteria of many types and species are to be found leading a saprophytic existence on the whole length of the mucosæ from the mouth to the anus, while in addition many foods, in certain stages of decomposition, carry an excess of bacteria, thereby adding fuel to the fire. Further, there is normally a continual warfare going on between the body cells and the body glands on the one hand and these saprophytics on the other, and should the protective forces of the former become at any time so lowered and the parasitic propensities of the latter so developed, manifestations of disease will soon become evident; or, in other words, when the equable balance which we call good health has been disturbed, disease will become established. Clearly, then, rational treatment consists of fortifying the protective elements, destroying the bacteria and eliminating them and their products. Fortunately for practitioners and patients, these two methods are inseparably interwoven into one. If the food is germ-laden to an abnormal degree, as, for example, in decomposing roots, fungoid-contaminated grain, putrid flesh, etc., an aperient at the outset is indicated. This will eliminate many bacteria and their toxins, and at the same time help to activate the mucosæ cells in the carrying out of their phagocytic processes. A strong purgative, however, will tend to lower the protective index, and is therefore contra-indicated. The aggressive activity of the bacteria upon the intestinal mucosæ, and the consequent liberation of toxins, exert in spasmodic colic a tetanizing influence upon the nerve terminals, being largely responsible for muscular spasm and a marked diminution in the supply of blood to the mucous membrane. Clearly, then, what is required here to overcome this condition is an antispasmodic and diffusible stimulant. The former quietens the nerve fibres, while the latter, by raising the central blood-pressure, exerts a dilator influence in the intestinal terminal vessels. During the hyper-activities among the bacterial flora found in intestinal cases, one must remember the acid and gas formations which occur, as particularly seen in flatulent colic, and apply suitable remedies to counteract them. Here alkalies and antiseptics are indicated. At the outset of an attack of colic in the horse, a dose of resorcin, turpentine, and linseed oil should be administered:

℞ Resorcini	ʒii.
Olei Terebinthæ	℥ii.
Olei Lini	O.ii.

M. Ft. haust. Repeat in an hour if necessary.

If relief is not obtained, the following should be given:

℞ Liquoris Ammoniæ Fortioris	ʒss.
Tincturæ Nucis Vomicæ	℥ii.

M. Ft. haust.

This mixture to be given in 1 pint of linseed gruel, and repeated in two hours if necessary in a pint of gruel, or the following may be given:

℞ Pulveris Nucis Vomicæ	ʒii.
Ammonii Carbonatis	℥i.

M. Ft. pulv. To be given in flax gruel.

In very obstinate cases the writer has found excellent results follow the administration of—

℞ Camphoræ Flor.	ʒii.
Chlorati Hydrati	ʒii.
Olei Lini	O.i.

M. Ft. haust.

In other cases ½-ounce doses of tincture of chloroform and morphia combined with 1 to 2 drams of extract of belladonna often brings relief.

Hot-water enemas are very helpful. It is always well to begin by injecting the water at 105° F., increasing to 110° F., and if a fair quantity is retained it is a hopeful sign. On the contrary, if it is evacuated as soon as injected, it is suggested that the case may end fatally. Hot fomentations to the abdomen by the use of rugs wrung out in very hot water also relieve internal pain and tension. The injection (subcutaneous) over the shoulder of ½ gallon of boiled water to which has been added 3 ounces of common salt and 5 grains of potassium permanganate assists in equalizing the circulation and relieving the spasm. For this the writer uses a human enema syringe, fitted to the end of which is a bayonet-pointed needle. An ordinary enema syringe may be improvised by making an incision into the skin over the shoulder large enough to admit the nozzle, taking care not to make the wound too large, or a considerable quantity of the fluid being injected may escape. When the operation is complete, the wound should be tightly plugged with cotton-wool to prevent the escape of the solution. To facilitate the absorption of the fluid, the resulting swelling should be well kneaded with the hand. The patient may become restless, in which case he should be walked about for a time. The following day the front leg will be swollen, but this gradually disappears. A fixation abscess may also form and require lancing. This is of no serious import. On the contrary, such abscess formation may be looked upon as a salutary therapeutical measure to be encouraged rather than evaded. In tympanitic colic, if there is a considerable accumulation of gas, paracentesis abdominalis should be performed. The site of operation is in the centre of the triangular space formed by the last rib, the lateral processes of the lumbar vertebræ, and the external angle of the ilium on the *right* side. The skin at the site of operation should be sterilized with tincture of iodine, and a 9-inch semi-curved trocar and canula inserted in an almost perpendicular direction into the lumen of the colon. Withdrawal of the trocar admits of the escape of gas. When the swelling in the flank has subsided, the writer invariably inserts through the canula with a quittor syringe the following:

℞ Resorcini
Olei Caryophylli } .. .. āā ʒi.
Olei Terebinthæ .. .. ℥ss.
M. Ft. injectio.

The hypodermic injection of morphia and atropine in all cases where the pain is very acute should be given, but such agents as barium chloride, physostigmine,* etc., are too drastic for routine practice, and to a lesser degree the same applies to the indiscriminate use of aloes. *On no account must the patient be allowed to roll.*

* The hypodermic injection of arecoline has many advocates.

[**Colic in the Camel.**—Frequently camels fed on dry and bad fodder show signs of abdominal pain. In such cases, when treatment is commenced at once, good results are obtained by the administration of 3 ounces of chlorodyne and 1½ pounds of Epsom salts in a gallon of water. If the pain has not ceased within three hours, a further dose of 3 ounces of chlorodyne should be administered. All food should be withheld for twelve hours, but the camel should be allowed to drink as much water as he likes. The substitution of good fodder for the bad fodder is absolutely essential, or diarrhœa and dysentery will result and the camel will rapidly lose condition.

Abdominal pain is a prominent symptom in the camel when suffering from tympanites. Our efforts in such cases must be to relieve the flatulence, and this can be brought about by the administration of 4 ounces of turpentine oil combined with 2 to 3 drams of carbolic acid in 2 pints of linseed oil. All food should be withheld, and if after two hours the camel is still showing signs of pain, 2 pounds of Epsom salts combined with 4 ounces of chlorodyne in a gallon of water should be given.

Abdominal pain is met with in camels suffering from peritonitis caused by foreign bodies penetrating the rumen. In such cases no medical treatment is of any avail.

We also get abdominal pain in camels suffering from rinderpest, pericarditis, and endocarditis. In such cases the pain must be relieved by sedatives such as chlorodyne, camphorodyne, tincture of opium, and chloral; they must be repeated every three hours till relief is obtained. Excellent results are obtained in camels showing abdominal pain by the administration of a large dose of Epsom salts combined with a sedative, the sedative being repeated every three hours till relief is obtained. In camels that are frequently showing signs of abdominal pain the daily administration of ammonium carbonate combined with nux vomica (2 ounces and ½ ounce respectively) for ten days acts beneficially. The fæces of camels that are subject to frequent attacks of colic should be daily examined, and on the slightest sign of constipation small doses of magnesium sulphate should be given.—*H. E. Cross.*]

COLLAPSE AND SURGICAL SHOCK.

The best method of treating this condition is by the intravenous injection of normal saline solution to which has been added, for large animals, 2 ounces of brandy, and for small animals 1 to 2 drams. The skin should also be massaged. When breathing appears to fail, artificial respiration should be practised, the head being lowered to allow easy access of blood to the brain. Blows dealt over the heart with the open hand also tend to stimulate that organ. The repeated inhalation of strong ammonia, with a hypodermic injection of strychnine, is also indicated. If there is more pronounced evidence of shock than of collapse, strychnine is contra-indicated, and an injection of morphia and atropine should take its place. In collapse following shock the injection of adrenalin also is a useful adjuvant.

COLON, IMPACTION OF THE.

Impaction of the colon is a common condition in equine practice, and is principally due to dietetic and masticatory irregularities. The muscular wall of the colon, and most probably portions of the other intestines, are in a state of atonic paralysis, and it is with the view of counteracting this state of inertia that the practitioner's energies must be directed. This object is best attained by Reek's stimulating treatment—namely, large doses of ammonia and nux vomica:

℞ Pulveris Nucis Vomicæ .. .. .. ʒiii.
Ammonii Carbonatis .. .. , .. ℥ii.
M. Ft. pulv.

The first dose to be given in $1\frac{1}{2}$ pints of linseed oil, and repeated every two or three hours in a quart of flax gruel. If peristalsis is still in abeyance, the writer prefers to inject the two antagonistic alkaloids, strychnine 1 grain and atropine $\frac{1}{2}$ grain, repeating in five to six hours if necessary. If the animal is in much pain, 2 drams camphor and 1 ounce chloral hydrate should be given in a pint of gruel, and the dose repeated if necessary. Extract of belladonna in 2-dram doses in some cases produces marked improvement. Hot-water enemas injected by a long tube syringe also relieve tension and stimulate peristalsis. The patient should be prevented from rolling, and forced exercise hastens the action of the medicine. The writer has for several years obtained excellent results by injecting under the skin of the shoulder in the proportion of sodium chloride 2 to 4 ounces, boiled water 1 gallon, to which is added 5 or 10 grains of potassium permanganate. After this injection the leg will swell, and an abscess may form on the shoulder or forearm, but beyond this no further sequelæ have ever followed.* The solution appears to act as a diffusible stimulant, and a counter-irritant, both of which reduce the abdominal pain; thirst is increased, and the gastro-intestinal secretory organs are activated to a marked degree. Kneading the colon with the hand inserted as far into the rectum as possible tends to stimulate this organ. After the pain has passed off and the bowels begin to act, the patient may be allowed sloppy bran mashes, but no solid food for three or four days. In cattle practice the patient should have a purgative at the outset, composed of 8 ounces Glauber salts, 8 ounces common salt, and

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* See also notes under Normal Saline Solution.

1 to 2 pounds of treacle. If this does not effect relief, 1½ pints of linseed oil and 1½ drams of liquor ammoniæ fortis should be given; later, if necessary, nux vomica 1 dram, ammonia carbonate 1 ounce, in a quart of flax gruel three times daily should be ordered. Enemas, as recommended by some authorities, have proved in the writer's hands futile in cattle practice.

COMA.

This condition may arise from direct injury to the brain, or it may follow apoplexy, sunstroke, or uræmic auto-intoxication. The cause must therefore be ascertained and treatment meted out accordingly; consequently, only a general line of treatment need be indicated here. The patient must be placed in a comfortable position and a full purgative administered. Cold water is thrown on the head, and a strong mustard plaster applied to the spine. Normal saline solution and small doses of strychnine hypodermically injected can do no harm. If a return to consciousness takes place, the head must be supported, and sodium iodide with ammonia administered. It may be added, however, that coma in the lower animals is an unsatisfactory condition to treat, inasmuch as, if a return to the normal should take place, the patience of owner and attendant alike is taxed to the uttermost before a return to *complete* utility is obtained, and that, in the majority of instances, is very unusual. In the vast majority of cases, therefore, the question arises, Is treatment an economic proposition?

CONGESTION, ACUTE PULMONARY.

Congestion of the lungs is most commonly seen in hunters as the result of a hard run, more especially when the animal is too fat and out of condition. It is also occasionally seen in other animals, and, unlike inflammation of the lungs, it may be cut short if the practitioner sees his patient at a sufficiently early stage. If the heart's action is laboured, ½ gallon of blood should be taken from a large wound in the jugular as a first aid, after which a diffusible stimulant, such as a pint of whisky, may be administered or the following prescribed:

℞	Tincturæ Nucis Vomicæ	ʒss.
	Spiritus Ammoniæ Aromatici	℥i.
	Aquæ	ad O.i.

M. Ft. haust.

A mustard plaster should be applied to the chest, the extremities well rubbed and bandaged, the body rugged, and the animal placed in a large, well-ventilated loose-box. If the case does not rapidly improve, 4 litres of normal saline solution should be injected subcutaneously, with the addition of 2 ounces of brandy; and a hypodermic injection of strychnine may also be given. In event of failure to cut short the condition, pneumonia will almost certainly follow, and this must be treated accordingly.

CONJUNCTIVITIS.

Whether conjunctivitis is the result of a local injury or a complication of some constitutional disease, it is actively microbic, and the following essentials must be carried out: (1) The repeated removal of all purulent accumulations from the eye by spraying or irrigating with weak salt solution; (2) the destruction of bacteria by weak antiseptic astringent solution (for which there is nothing better than a 1 to 2 per cent. solution of silver nitrate), after which the eye is irrigated again with normal saline solution, the object being to precipitate the silver salt; (3) to prevent the eyelids from adhering together, the edges may be smeared with weak boric ointment, or Singleton's golden ointment can also be strongly advised; this should be applied daily to the lids with a clean camel-hair brush; (4) when the conjunctiva is greatly swollen, pressure on the cornea takes place, and this is liable to cause ulceration and sloughing of the part. In exceptional cases on reaching this stage there should be no hesitation in snipping the external canthus with a pair of fine scissors, the incision extending, of course, from the conjunctiva to the skin. Mechanical pressure is thereby relieved and a greater freedom for drainage obtained. If the case fails to respond to the above general treatment, the eyelids should be irrigated every three or four hours with the following:

℞ Zinci Sulphatis	grs. x.
Acidi Borici	grs. xx.
Cocainæ Hydrochloratis	grs. vi.
Aquæ Rosæ	ad ℥viii.

M. Ft. collyrium.

At intervals between this dressing the writer has found that considerable benefit is derived from irrigating the conjunctiva for fifteen minutes two or three times a day with a low-pressure water spray from a hose-pipe. If corneal ulcer develops, eserine solution 2 grains to the ounce should be used as a corneal stimulant (see Corneal Ulcer). Needless to add, the general health of the patient should be attended to, and tonics, if necessary, administered.

CONSTIPATION.

This condition is most commonly seen in pampered dogs and over-fed horses, both lacking a sufficiency of exercise. Suitable laxative diet should be prescribed. For the horse, plenty of bran, and roots if in season, may be ordered, and one to two wineglasses of linseed oil in a pint of flax gruel night and morning mixed in manger food. The following powder given daily in food also counteracts atony of the bowels and torpidity of the liver:

℞	Aloes Barb.	ʒi.
	Nucis Vomicæ	ʒii.
	Sodii Sulphatis	℥ii.
	Sodii Chloridi	℥i.

M. Ft. pulv.

An occasional ½ pint of treacle mixed with the manger food is also a useful adjuvant. Water should be allowed *ad lib.*

Treatment for the dog consists of the administration of a teaspoonful or dessert-spoonful at the outset of liquid paraffin or linitol, according to size, repeated at intervals, and followed up by—

℞	Extracti Cascaræ Sagradæ	gr. i.
	Tincturæ Belladonnæ	♏iii.
	Tincturæ Nucis Vomicæ	♏$\frac{1}{10}$
	Aquæ	ʒi.

M. Ft. haust. One teaspoonful to be given night and morning.

Or—

℞	Sodii Sulphatis	grs. xx.
	Tincturæ Belladonnæ	♏v.
	Tincturæ Nucis Vomicæ	♏½
	Infusi Sennæ	♏xxx.

M. Ft. haust. To be given two or three times a day before meals.

Enemas consisting of soap and water or glycerine suppositories should also be administered. Where impaction of the rectum exists, an injection should be given of strained flax gruel, added to which is ½ ounce each of salad oil and turpentine oil.

Massage of the abdomen and kneading of the abdominal wall may also be carried out daily. With regard to diet, oatmeal and wholemeal bread should be freely given. Starchy foods, white bread, potatoes, etc., must be avoided.

[**Constipation in the Camel.**—The best purgative for camels is magnesium sulphate in doses of 1½ to 2 pounds. Other purgatives that may be given are—Kamela 8 ounces, castor oil 3½ drams, aloes in solution 3½ ounces, gamboge 3 ounces, linseed oil 4 pints, eserine and pilocarpine 2 grains of each subcutaneously.—*H. E. Cross.*]

CONTAGIOUS CATARRH, OR INFLUENZA (CAMEL).

In this disease the mortality is very high if the camels are not properly attended to. They should not be tied down during the day, but allowed to browse. If this is impossible, they should be fed on grain and green fodder, and at night, if the weather is cold, covered with blankets. The most satisfactory treatment is ammonium carbonate in 1-ounce doses given night and morning in cold rice gruel. Any tendency to constipation should be counteracted by the administration of 8 to 12 ounces of Epsom salts. The daily administration of 4 ounces of hyposulphite of soda acts beneficially. The camels should be allowed a liberal diet of green food and water *ad lib.* The temperatures of all camels should be taken daily, and no camel should be worked for at least ten days after his temperature has become normal. If a case of contagious catarrh has occurred amongst a herd of camels, it is better to allow the disease to run through the whole herd rather than attempt methods of isolation and segregation.—*H. E. Cross.*

CONVULSIONS.

The inhalation of chloroform or amyl nitrite, followed by the hypodermic injection of morphia, or the rectal injection of 2 drams chloral hydrate and 4 drams potassium bromide dissolved in 3 pints warm water for a horse and cow, and for the dog a rectal injection of 5 grains chloral and 10 grains bromide in 4 ounces of warm water, proves the most satisfactory treatment. The patient should be kept warm and under restraint to prevent injury. After the acute symptoms have been reduced, a purgative should be given, consisting of aloes for the horse, soda sulphate for the ox, and aloes or calomel for the dog. In the case of the dog, worms should be looked for, and if present removed by the administration of suitable vermifuges, and at the same time the possibility of teething irregularities must not be overlooked. In severe cases it may be necessary to administer normal saline solution, either intravenously or subcutaneously.

CORNEAL ULCER.

The treatment here must be on similar lines up to a point to that advised for conjunctivitis—in fact, ulceration of the cornea is not an uncommon sequel to conjunctivitis, when the two conditions may be treated concurrently. The primary objects in treating corneal ulcer are to prevent (1) perforation, and (2) extension of the ulcerous edges. This double object is attained by cauterization, either by electrolysis or pure carbolic acid. A local anæsthetic should be applied to the cornea. Three or four applications of a 2 per cent. solution of cocaine, at intervals of two or three minutes, answers this purpose. The eyelids should be kept apart with an eye speculum, the patient's head steadied, and, where the electro-cautery is used, the edges and base of the ulcer are thoroughly cauterized. Where carbolic acid is used, the ulcer is carefully and gently dried with cotton-wool fixed on a pair of forceps and all lymph deposits removed from the eye. Clean blotting-paper may also be employed for drying the ulcer. The point of a very fine camel-hair brush is now dipped into the acid and the ulcer carefully painted, after which a piece of blotting-paper is lightly drawn over the part, the object being to absorb the resultant moisture, preventing its overflow and consequent injury to the surrounding parts. It may be necessary to repeat the operation or application in two or three days. All accumulation of pus must be removed at intervals by cold-water irrigation. The insertion of a little yellow oxide of mercury ointment from time to time often hastens resolution. In some cases dusting the ulcer with calomel answers very well.

CORNS.

By reason of weak formation of the heels, some animals are more predisposed to corns than others. A corn may be present, however, in the most perfectly formed foot, and here bad shoeing is invariably the cause. Corns are usually situated on the inside heel of the fore foot. If the animal is lame, the shoe must be removed and the foot placed in an antiseptic poultice. If the corn is suppurating, free exit of the pus by the use of a searcher is indicated, after which a few drops of muriate of antimony is poured into the cavity. It is, however, bad surgery to remove *too much* of the sole at the seat of the corn, for by so doing the heel becomes weakened and thereby predisposed to corn formation. In the hands of a good shoeing-smith horses should be almost immune to corns, the primary object being to see that the seating of the heel of the shoe does not rest upon the sole. When the heel is extensively diseased, a three-quarter shoe is advised.

COUGH.

A cough is only a symptom of a condition which may arise from diverse causes. To treat a cough successfully, therefore, the cause must be ascertained and, where possible, removed. General indications for treatment of a cough need only be alluded to briefly here. If the cough arises from the respiratory tract, the seat should be located. Thus, in cattle, the short, hacking cough combined with wasting is suggestive of tuberculosis, in which case rich food, cod-liver oil, and the drying up of the milk, are indicated. Again, growths, tubercular or actinomycotic, in the seat of the pharynx or larynx must be removed or absorbed by saturating the system with potassium iodide or biniodide of mercury. If the cough is bronchial, expectorants such as ipecacuanha or potassium chlorate are advised, and if irritable and spasmodic, belladonna is indicated. If the cough arises from hepatic trouble, a dose of aloes or calomel may be given, and salines are advised also. If it should be stomachic, an aperient followed by gastric sedatives and antacids, such as bismuth, sodium bicarbonate, and chlorodyne, are indicated. If intestinal worms are suspected of being the cause, then worm medicines must be prescribed.

COW POX. *See* Variola.

CRACKED HEELS IN HORSES.

This is a troublesome complaint, especially in hairy-legged, phlegmatic cart-horses, and is most commonly met with during the wet winter months. It is largely a disease of mismanagement. All hair and dirt must be removed from the heel, and if the animal is lame the heels should be fomented with hot water, added to which is a little common salt, the skin dried, and the following astringent lotion applied:

℞	Acidi Borici Zinci Sulpho-Carbolatis	āā ʒii.
	Glycerini	℥i.
	Aquæ	℥xx.

M. Ft. lotio. To be applied night and morning.

When the cracks dry, an ointment is advised:

℞	Zinci Oxidi Acidi Borici	āā ʒi.
	Vaseline	ad ℥i.

M. Ft. ung. To be applied night and morning.

The general health should be attended to, and a dose of physic administered, followed by a course of powders:

℞	Arsenicum Albus	grs. v.
	Ferri Sulphatis	ʒi.
	Sodii Chloridi	℥i.

M. Ft. pulv. One night and morning in manger food.

The drains and general surroundings of the stable must also be attended to.

CRAMP, MUSCULAR.

This is not uncommonly met with in hunters as the result of over-fatigue, affecting a set or sets of muscles. Hot fomentations should be applied to the parts, and stimulating anodyne liniment well massaged in. Belladonna, turpentine, and soap is the best to use.

CRETINISM.

The nearest approach to this condition as it is seen in man is to be found in the dog. Small doses of thyroid extract may be tried. One grain of thyroid powder should be administered nightly for a week, increasing this dose weekly until 5 or even 10 grains have been reached.

CRIB-BITING AND WIND-SUCKING.

An animal subject to this condition should be fed from a bucket, and when not feeding he should wear a muzzle or have a throat strap fixed on his neck. As a rule, there is also gastric trouble, and to correct this a course of stomachic tonics may be given, composed of gentian, nux vomica, and soda bicarbonate, while a dose of aloes often acts as a corrective.

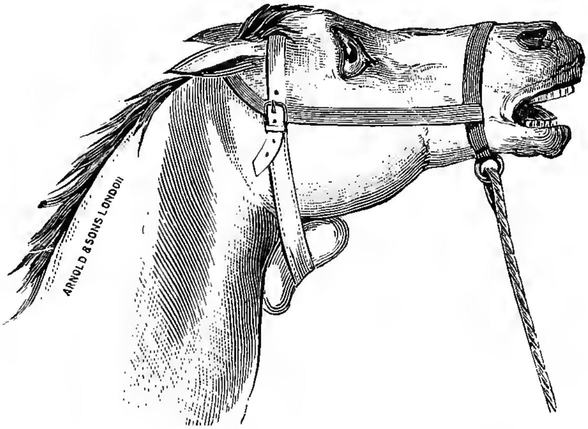

Fig. 34.—Anti-Crib-Biting Pad (Blackman's).

CRYPTORCHIDISM.

The term "cryptorchid" is understood in veterinary parlance to refer to an animal with one or both testicles misplaced. These organs, instead of being situated in the scrotum, have to be sought for in some abnormal situation, usually the inguinal canal or the abdomen, or even subcutaneously along the exterior of the belly. If in the former, their removal involves very little more risk than an ordinary castration; but if in the abdominal cavity, the utmost care and surgical cleanliness must be observed in order to avoid peritonitis and other sequelæ. In fact, it then becomes an operation which is best left to the specialist. As with the lucky-bag competition at a bazaar, the operator can never say beforehand with any amount of certainty what he is going to find inside the abdomen of a "rig" or "ridgling" (which is the name given to such an animal by the agriculturist and horse-dealer). The misplaced testicle may be abnormally small or abnormally large, cystic or cirrhotic, of all curious shapes and sizes, and contain cartilage, bone, teeth, hair, or even strongyle worms. Occasionally one testicle is missing altogether, and in rare instances both have been recorded to be absent as congenital defects. An animal born with only one testicle is known as a " monorchid," and one with both organs missing is technically termed an " anorchid."

Cryptorchidism is met with in all animals, and is a condition which is very hereditary. It can be carried through the female stock as well as through the male, and is equally transmissible from either sire or dam. This is a point which the veterinary adviser cannot too strongly impress upon his breeder clients, whether the animals they possess are horses, cattle, sheep, pigs, dogs, or even cats. The author of this article, from experience of over 1,000 operations for this condition, has made many observations upon this particular point, the importance of which cannot be too strongly emphasized.

In all animals the retention of a hidden testicle is apt to cause the subject to be troublesome, and at certain seasons of the year even to become vicious and dangerous. This, in an animal like the horse, renders the removal of the testicles necessary, and occasionally in the dog the same happens. Another reason for the necessity for operative interference in the horse is that a colt in this condition cannot be turned out with other animals, on account of its troublesome sexual propensities. These not only assert themselves when with other colts or fillies, but also with bullocks and other cattle.

In all animals the testicle can, if in the abdomen, be reached from a flank incision, and this is the site usually selected in the bull, the ram, and the boar. In the dog the median line of the abdomen is preferable, and in the horse the usual method is to enter the abdomen through the inguinal canal.

In all cases the usual antiseptic precautions are taken in regard to the instruments, the hands of the operator, and the skin of the patient, and the patient is placed under the influence of an anæsthetic.

With the smaller animals the incision made need only be large enough to admit the middle finger, with which the cord is sought for; and, when found, the testicle is withdrawn. A ligature is applied to each in turn, and the removal is practically a bloodless proceeding.

In the larger animals the whole hand may have to be inserted and the testicle sought for. When found, it can be removed either by an emasculator, a sterile ligature, by torsion, or an ecraseur. The latter is the most universally useful in the horse, as sometimes the spermatic cord is too short to permit of the withdrawal of the testicle into view, and the chain end of the ecraseur has to be inserted deep down into the inguinal canal, and even, in occasional instances, into the abdomen itself.

The most satisfactory position of the horse, when cast and anæsthetized, is on its back, with the hind legs well extended, and to aid in obtaining the latter a back rope or a spreader are equally useful. The latter is a specially made piece of iron, jointed in the centre, and with ends shaped so that they fit on the hind legs just above the hock and keep the legs apart. An ordinary rope, however, looped above one hind fetlock, passed under the loins, and then tied around the opposite hind leg, serves the purpose of pulling the legs apart equally well.

Having cleansed the skin with petrol and painted it with iodine (a method much preferable to washing and scrubbing), the operator, with the aid of a scalpel and director, makes an incision just through the skin in the scrotal region on the side on which he cxpects to find the missing testicle. Tearing apart the subcutaneous connective tissue and taking great care not to injure the inguinal plexus of veins, the hand is passed, with the fingers in the form of a wedge, into the inguinal canal, where a careful search is made for any evidence of the missing testicle.

Care and judgment must be used here that the testicle is not passed by without being observed, and it is also a wise plan to be on the alert for evidence of the end of a spermatic cord from which a testicle has been removed previously. This is necessary to bear in mind, as the history of a "rig" is often vague and unreliable. If the complete testicle is found, all well and good, but it may be that the epididymis alone, or perhaps only the body of the testicle, will be found in the canal, the other portion being in the abdomen. Endeavour must be made to get it all into the canal, and to do this the abdomen may have to be entered in order to effect this object. Once in the canal, the ecraseur chain is placed round it and the whole is removed.

Should nothing at all be found in the canal, the operator scrapes through the peritoneum with the nail of the middle finger and inserts the second and third finger, in the hope of hooking out the testicle through the small orifice made. Should this not succeed, the whole hand is inserted and a search commences for the missing organ. It is at this stage that one notices the benefit of having had the patient well fasted previous to the operation, and care must be taken not to mistake a piece of bowel for testicular tissue.

If not found within a few moments, the bladder should be sought for, and it can readily be traced between this and the internal inguinal ring.

Once found, it is, if possible, withdrawn and removed with the ecraseur. In using the words "if possible," the writer does so with a practical experience of the difficulties sometimes met with. It is not at all uncommon to meet with a cystic testicle as large as a Rugby football full of fluid, and so tense that it resists all efforts to get the chain of the ecraseur around it. In such a case a small hollow trocar, or even a hollow needle with a long piece of tubing attached, is introduced in the hand and the cyst is punctured, the tube permitting the contents to escape externally; or it may be punctured with the finger-nail and the contents allowed to escape into the abdomen. The writer has done this on several occasions and, the contents being aseptic, no ill result has followed. Once the fluid has escaped, the cyst wall can be gripped through the hole made and then withdrawn into the noose of the chain.

Extraordinarily large tumours, dentigerous cysts, and dermoids, are all difficult problems to be got over, and sometimes, when the size would necessitate an enormous wound, it is policy to try to sever the spermatic cord and allow the tumefied testicle to slip back into the abdomen. It has been aseptic before being interfered with, and if it has not been contaminated by the operator no harm to the patient will follow. This the writer has done on several occasions.

After the removal of the testicle the wound is sutured, the sutures being inserted sufficiently closely to prevent any escape of bowel into the inguinal canal, a good grip of the skin being taken. These are removed on the fourth or fifth day, and the part is treated as an open wound.

The dietary should be light, sparing, and laxative, for the first few days after the operation, and the question of exercise must depend upon the progress made in each case.

With modern methods of surgery the prospects of a successful sequel, and of converting a troublesome brute into a useful animal, are excellent, and the proportion of fatalities, even when the abdomen has been entered, is very small.—*Frederick Hobday.*

CURB.

Largely a disease of conformation, curb is, however, sometimes seen in the best-shaped hock. If the sprain of the ligament is acute and painful, rest must be ordered, a dose of aloes given, hot fomentations and lotio alb. applied, and a high-heeled shoe put on. When the acute stage is reduced, a biniodide of mercury blister (1 in 8) should be rubbed in, and repeated if necessary. In horses with sickle-shaped hocks, feather firing over the hock offers the best chance for future usefulness.

CYSTIC CALCULI. *See* **Calculi.**

CYSTITIS. *See* **Bladder Diseases.**

CYSTICERCI (PIG). *See also* Parasitic Diseases.

Curative treatment is of no avail. Prophylaxis consists of rendering it impossible for the pig to ingest the eggs of the *Tænia solium.*

DANDRUFF.

This condition is most commonly seen in the horse or dog, and in some cases it is most difficult to cure. The affected skin should be washed with hot water and soap, with a little borax added. This must be repeated once a week. Every other day the following dressing is rubbed into the skin:

℞	Sulphuris Precipitati	℥i.
	Liquoris Potassii	ʒi.
	Olei Ricini	℥viii.

M. Ft. lini.

If the skin becomes dirty or sticky, it may be cleansed occasionally by the application of a little benzine. If this treatment fails, 4 drams of salicylic acid should be added to the above prescription. The skin should be stimulated by the free use of the body-brush. The diet must be generous, and if necessary a course of mineral and vegetable tonics prescribed.

DEBILITY.

General debility is due to a variety of causes—malnutrition brought on by bad food, teething irregularities, chronic dyspepsia, chronic diarrhœa, parasitic invasions, fevers, senile decay, etc. In young animals, provided no vital organic trouble has arisen, the removal of the cause, combined with good, nutritious food, healthy surroundings, and judicious nursing, often works wonders. In all cases a laxative should be given at first. If the animal is anæmic, iron salts are indicated; and if dyspeptic, gastric tonics, etc., may be given.

DENGUE (THREE DAYS' SICKNESS).

The administration of a purgative is desirable if it can be done without danger to the patient. Most cases recover without treatment, but attention to hygienic conditions and nursing is necessary.

The cause of the disease being unknown, it is not possible to prescribe preventive measures.—*G. K. Walker.*

DENTAL CARIES.

The mode of living and the average life of animals as compared with man largely account for the paucity of cases of dental caries met with in veterinary practice; nevertheless, the practitioner sometimes has his attention directed to a carious tooth, particularly in the dog. The molars are the teeth usually affected, and it often happens that before attention is drawn to the case the greater part of the crown of the tooth has become diseased, in which case it is advisable to extract it. Where, however, a superficial destruction only has taken place in valuable dogs, the diseased parts should be curetted, touched up with pure carbolic acid, and plugged with hard fixing and stopping.

DENTIGEROUS CYSTS.

These occur in various parts of the animal body, but the regions where their presence gives most trouble, and often calls for surgical interference, are at the base of the ear or in the submaxillary sinus. A breaking down of the tissues at the seat of the cyst takes place at some period, and in probing along the resultant sinus a hard substance is detected. The sinus should be laid open and the abnormal tooth extracted. The cavity is then plugged with a mild antiseptic dressing, and the whole treated as an ordinary wound. In those cases where the submaxillary sinus is involved trephining is necessary (see Trephining).

DENTITION, DISORDERS OF.

During the period between three and four years in horses and two and three years in cattle, these animals pass through a dentition stage, which in some cases is so severe that constitutional disturbance becomes evident in the form of indigestion, diarrhœa, anæmia, and a general systemic unthriftiness. In some cases dentition fever is present, and where this is diagnosed an aperient should be given, which tends to lower the congestion of the gums. Three drams of aloes and 1 dram of calomel for the horse and 12 ounces sulphate of magnesia for the ox is given; also, alterative tonic medicine may be prescribed.

℞ Ferri Sulphatis Exsiccati .. .. .. ʒi.
Calumbæ Radicis .. .. ʒii.
Potassii Nitratis }
Sodii Chloridi } .. .. āā ʒss.

M. Ft. pulv. One to be given night and morning in manger food.

The diet should be light, digestible, and sloppy—boiled roots, mashes, steamed hay, and in suitable seasons a long run at grass often does much good. Where the gums are painful and much congested, judicious lancing gives immediate relief. In the case of puppies, these patients sometimes become very irritable and unthrifty during dentition. A purgative composed of ½ to 1 grain of calomel and 1 to 2 grains grey powder, according to size, should be given, and if the irritation is considerable, 5 to 10 grains bromide of sodium is advised. This latter agent also tends to prevent convulsions.

DERMATITIS.

Inflammation of the derma arises from a variety of causes, and treatment must be prescribed accordingly.

Dermatitis, Bullous.—If the vesicles are large, they should be ruptured, and a dry dusting powder applied night and morning:

℞ Zinci Oleatis	ʒi.
Amyli..	℥i.

M. Ft. pulv.

Where the irritation is great, weak lotio alb. to which is added 1 ounce tincture of opium to the pint often gives relief.

Dermatitis, Erysipelatous.—As there is invariably constitutional disturbance in this disease, a purgative should be given, followed up by a course of salines. Locally, the parts should be bathed with hot salt water night and morning, and a mild astringent lotion applied, such as dilute solution of lead. If there is much irritation, the following may be used:

℞ Acidi Borici	ʒi.
Liquoris Plumbi Liquoris Calcis }	āā ℥i.
Olei Rapii	℥viii.

M. Ft. lotio. Apply night and morning.

DERMATITIS, PUSTULAR, CONTAGIOUS. *See* Acne.

DEW CLAWS, REMOVAL OF.

This is a very simple operation. The hair is clipped around the root of the claw, iodine is applied, and a local anæsthetic injected. The claw is drawn outwards from the limb by an assistant, and the operator, with a stout pair of semi-curved scissors, removes the claw at the base. The skin is then sutured, and if hæmorrhage is troublesome an antiseptic pad of cotton-wool with a bandage is placed over the part.

DIABETES.

Insipidus.—The exciting, if not the actual, cause of this disease is some dietetic irregularity, and before treatment is undertaken this must be investigated and removed. Fusty hay, kiln-dried or heated oats, grass, or roots which have been heavily top-dressed with nitrate of soda, are among the most common kinds of food which produce this condition as it is seen in the horse and ox. The patient should be given an aperient when first seen, and the following administered:

℞	Pulveris Ergotæ	℥i.
	Calcii Iodidi Ferri Sulphatis	āā ʒi.

M. Ft. pulv. One to be given night and morning in food or draught.

The diet should be limited to bran, crushed oats, and steamed hay. Water should be restricted, and the animal given complete rest for a few days.

Mellitus.—This is a much more serious disease than diabetes insipidus, and unless the case is seen early and treated with great discrimination the prognosis must be unfavourable. From observations made by the writer, diabetes mellitus in the horse and dog is more common than many practitioners suspect, and *it is to be deplored that a more systematic examination of urine is not carried out in routine practice.* If this were done, more lives would undoubtedly be saved, a truer diagnosis would be arrived at, while treatment would be less *empirical* and more *scientific.* As diet is of greater importance than drugs, the foods recommended are here given at length.

Diet.—Carbohydrates must be reduced to the minimum.

For the horse, vegetables which contain only a minimum of chlorophyl should be barred. These are potatoes, turnips, mangolds, parsnips, peas, and beans, whilst grass, oats, bran, and hay are excellent, and may be allowed *ad lib.*

For the dog, farinaceous foods, such as cornflour, white bread, rice, potatoes, are not allowed, whilst brown bread, raw meat, fats, fish, tripe, poultry, game, milk, cream, butter milk, and Glaxo, are recommended.

The quantitative analysis of the urine from time to time gives an accurate index of the progress or otherwise of the patient, and well repays the time spent.

Drug Therapy.—It may be at once stated that there is no drug specific for glycosuria, but probably opium and its alkaloid should hold first place.

For the horse:

℞	Pulveris Opii..	ʒii.
	Sodii Salicylatis	ʒiii.
	Calcii Lactatis	℥i.

M. Ft. pulv. One powder to be given night and morning in food.

Or—

℞	Arseni Trioxidi	grs. v.
	Pulveris Opii	ʒii.
	Calcii Hydratis	℥i.

M. Ft. pulv. One to be given might and morning in manger food.

For the dog :

℞ Pulveris Ipecacuanhæ Co.	grs. v.
Cretæ Preparatæ	grs. vii.

M. Ft. pulv. One to be given night and morning in a little milk.

Or—

℞ Pulveris Opii	gr. i.
Sodii Bicarbonatis	grs. x.

M. Ft. pulv. One to be given night and morning in a little milk.

DIARRHŒA.

Acute.—In the strict acceptation of the term, diarrhœa is not a disease but a symptom, and as the causes are many which contribute to its production, these must be first ascertained in order to promote successful treatment. Irritation in some form or other can usually be discovered, either in the gastro-intestinal mucosæ or in the large nerve plexuses which supply these organs. In all animals an aperient is, speaking generally, indicated at the outset—for the horse, 1 to 1½ pints linseed oil; for the ox, 1 pint linseed oil and 1 pound treacle in flax-seed gruel; for the dog, ½ to 1 ounce medicinal paraffin or castor oil—and the following prescribed:

For the horse and ox :

℞ Acidi Borici	ʒi.
Pulveris Catechu Co.	ʒiii.
Pulveris Zingiberis	ʒii.
Cretæ Preparatæ	ʒiv.

M. Ft. pulv. To be given in a pint of flour gruel night and morning.

Or—

℞ Tincturæ Chloroformæ et Morphinæ Co.	ʒiii.
Sodii Bicarbonatis Cretæ Preparatæ	āā ℥i.
Aquæ	q.s. ad ℥iii.

M. Ft. haust. To be given in a pint of flour gruel night and morning.

For foals and calves :

℞ Bismuthi Carbonatis	grs. xx.
Tincturæ Camphoræ Co. Tincturæ Cinnamomi	āā ʒss.
Aquæ Chloroformi	ad ʒiv.

M. Ft. haust. One tablespoonful in flour gruel every five hours until relieved.

Or—

℞ Pulveris Rhei	grs. v.
Sodii Bicarbonatis	grs. x.
Pulveris Cinnamomi	grs. vi.

M. Ft. pulv. One powder three times a day in a pint of arrowroot gruel and one wineglassful of lime water.

For the dog :

℞ Bismuthi Carbonatis	grs. x.
Tincturæ Opii	♏v.
Cretæ Preparatæ	grs. xv.
Mucilaginis Tragacànthæ	q.s. ad ℥i.

M. Ft. haust. Given three times a day.

Or—

℞ Hydrargyri Subchloridi	gr. $\frac{1}{10}$
Bismuthi Carbonatis	grs. v.

M. Ft. pulv. One powder on tongue three times a day.

In foals and calves the writer has found the *Bacillus coli* (even in what appear to be non-specific cases) a very aggressive cause of a troublesome form of diarrhœa; for the limitation of this infection, great reliance should be placed on boric acid, 20 grains calomel, 1 grain two or three times a day. Where the bowels in these young animals have been well emptied by a persistent peristalsis before the practitioner is called in, a laxative is contraindicated, as it would only increase the weakening of the patient. The following should therefore be given forthwith, and repeated every four or five hours until relieved:

℞ Tincturæ Chloroformæ et Morphinæ Co.	♏xx.
Bismuthi Carbonatis Acidi Borici	āā grs. xx.
Hydrargyri Subchloridi	gr. i.
Cretæ Preparatæ	ʒii.
Aquæ	q.s. ad ℥i.

M. Ft. haust. To be given in $\frac{1}{2}$ pint of flour or arrowroot gruel night and morning.

Where the patient is deriving its nourishment direct from the dam, an examination of the milk should be made, and a corrective in the form of 4 ounces sodæ sulph. and 1 ounce sodæ bicarb. given to the mother in a bran mash night and morning. Where the diarrhœa develops an infective type, the reader is referred to White Scour.

Chronic.—*In the horse* this condition may be due to faulty mastication, the result of teeth irregularities, setting up a chronic form of indigestion. The remedy for this, of course, lies in rasping the teeth and prescribing stomachics. In cases which have been fed on bulky food of an innutritious character, and permanent thinning of the gastric and intestinal walls has taken place, treatment can be merely palliative. Aromatic sulphuric acid and a concentrated, highly nutritious diet should be prescribed, and very little water allowed. Where organic disease of the liver or bowels is present, treatment is of no avail. A persistent chronic catarrh of the bowels is sometimes seen in practice, defying all forms of treatment, the cause of which is due to different bacteria. In these cases the following has perhaps given the best results:

℞ Acidi Borici
Acidi Tannici } .. .. āā ʒi.
Tincturæ Opii .. .. ℥i.
Acidi Sulphurici Aromatici .. .. ʒii.
M. Ft. haust. To be given three times a day in a quart of flour gruel and six eggs.

The treatment of diarrhœa caused by gastro-intestinal parasites will be found described under Parasitic Diseases.

In the Ox.—In cattle feeding upon rich pasture-land, particularly during a wet season, a chronic catarrh of the bowels is often noted. The condition begins with an acute dyspepsia, which is aggravated by the sameness of the foods acting as an irritant, with the consequent result that the intestinal mucosa is in a continual state of active hyperæmia, and thickening of the bowel coating. The normal digestive secretions are interfered with, and the food passes without the proper standard of nourishment being extracted from it. Here a complete change of diet must be sought for. The animal should be housed, and allowed bran, oats, bean meal, and steamed hay *ad lib.*, with flour gruel and milk to drink, and a course of the following medicine prescribed:

℞ Pulveris Cinchonæ Cort.
Pulveris Catechu } .. .. āā ℥ss.
Sodii Bicarbonatis
Pulveris Anisi } .. .. .. āā ℥i.
M. Ft. pulv. One powder to be given night and morning in a quart of thick flour gruel and 10 ounces of lime water.

After a few days of this treatment, a course of acid. sulphuric. aromatici in ½-ounce doses in eggs and flour gruel should be given night and morning, and if the appetite is good, ½ ounce tincture of opium may be added. If no improvement takes place, the writer has obtained good results sometimes from the following prescription:

℞ Tannalbin
Ipecacuanhæ Radicis } .. .. .. āā ʒi.
Hæmatoxyli Ligni.. .. .. .. ʒiv.
M. Ft. pulv. One to be given night and morning in flour gruel.

Special treatment of diarrhœa in the dog will be found under Distemper.

Diet.—The importance of prescribing a suitable diet in all cases of diarrhœa, whether acute or chronic, is obvious.

For the Horse and Ox.—Crushed oats, bean meal, with a little bran and hay chaff, may be allowed. Water should be withheld and thin flour gruel substituted.

For the Dog.—In acute diarrhœa boiled cow's skim milk and rice water, with a small addition of lime water, may be allowed. Arrowroot biscuits and white bread (rebaked in an oven) prove both nutritious and astringent. Should the diarrhœa persist and the fæces look curded, milk must be withheld and fresh whey substituted in the rice water. To stimulate the appetite, a little mutton broth or red-meat gravy may be added, or a little cooked sole. This diet may be changed in a few days by giving cornflour or arrowroot pudding. If there is nausea after food, 3-grain doses of ingluvin often give prompt relief.

In chronic diarrhœa, rice puddings, barley gruel, cornflour, fish, the white meat of chicken finely chopped, stale bread, rusks, and custards are indicated, in small quantities at frequent intervals.

Diarrhœa in the Camel.—Diarrhœa in camels may be due to several causes—for example, irritant drugs, oleander poisoning, the last stage of surra, rinderpest, etc., but the most common cause is dry, coarse, and bad fodder, which causes irritation of the intestinal tract. When diarrhœa is simply a symptom of some other disease, the treatment necessary for that particular affection should be adopted. When due to irritant drugs, the administration of Epsom salts combined with chlorodyne in 2 to 3 ounces in linseed tea, rice gruel, or milk, is indicated. When due to coarse, dry, and bad fodder, the fodder must be changed, and 12 ounces of Epsom salts administered, followed by a gallon of milk in which twelve eggs have been beaten up. The principle of treatment consists in removal of the irritant by the administration of a laxative, followed by a sedative—*e.g.*, chlorodyne or tincture of opium combined with demulcents such as linseed tea, eggs, milk, rice gruel, etc. If the animal is very weak and prostrated, stimulant treatment must be resorted to, and 4 ounces to 6 ounces of spiritus etheris nitrosi in 2 pints of water should be given every four hours till the prostration is overcome. A liberal diet prescribed, water should be allowed *ad lib.*, and if the weather is cold the animal should be well rugged up and kept warm.—*H. E. Cross.*

Diarrhœa (Specific) in Calves.—See White Scour.

DILATATION OF THE HEART.

It is obvious that treatment here can only be palliative. All extra strain upon the heart and circulation from internal and external sources must be reduced to a minimum. Overloading the stomach with bulky food is contra-indicated—in fact, good digestion is specially called for. The patient must therefore be placed upon a concentrated and easily digested diet. For the horse, crushed oats, bran, and the best hay chaff should be ordered, and if the animal inclines to eat his bedding, sawdust must be substituted for the straw. Upon no account should the animal be worked upon a full stomach. The work should be steady as against straining, and light work is better than none at all, as better general health of the whole system is thus maintained, and the risks of fatty infiltration and degeneration are reduced. Small doses of digitalis and nux vomica may do good by correcting cardiac irregularities.

DISCOMYCOSIS. *See* **Botryomycosis.**

DISLOCATIONS.

Lower Jaw.—Dislocation is most commonly seen in the dog, and is always in a forward direction. It may be either unilateral or bilateral. If the dislocation has just taken place, replacement is usually easy. The dog should be fixed by hobbles to a table and steadied by an attendant. The operator stands in front of his patient, and inserts the thumb of each hand as far back into the mouth as possible, pressing down upon the molars of the lower jaw, whilst the fingers of each hand grasp the rami from below. Downward pressure of the thumbs combined with upward pressure of the fingers should succeed in reducing the dislocation. In the event of failure by this method, two stiff corks are inserted into the mouth, each resting on the posterior lower molars. Pressure by both hands is now exerted upon the upper and lower jaws with a view to bringing them together, with the result that the dislocation becomes reduced.

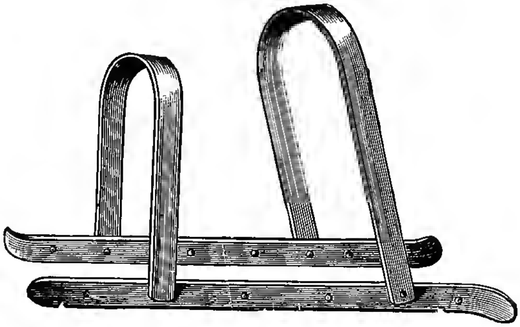

FIG. 35.—KUNDSEN'S IRON SPLINT FOR DISTORTION OF THE NECK.
(Dollar's "Regional Surgery.")

Note.—In young dogs care must be taken not to use too much force, owing to risk of fracture.

Neck.—This condition is more often seen in the horse and as the result of injury. In complete dislocation the after-results are always fatal, and in these cases attempts at reduction only hasten the fatal issue. Where there is evidence of partial dislocation, much may be done by raising the animal's head and keeping it raised, by tying up to the rack with a double halter, applying hot fomentations to the neck and massaging with stimulating anodyne liniments to reduce muscular cramp; it may be considered advisable to adjust to the neck a metal splint to prevent a recurrence. It is sound practice also to place these cases in slings at the outset. Some authorities may dispute the accuracy of the term "dislocation" in these circumstances; but although there is not any displacement of the central axis of the cervical bones, there is undoubtedly dislocation of their lateral processes, and as such their entry under this heading is justified.

Shoulder.—Dislocation of the shoulder is most commonly seen in the ox. One animal "rides" the other, and in the act of slipping off sideways the articular head of the humerus leaves the scapular cup. The same remarks apply also to colts running at grass. Attempts at reduction may be made by an attendant, standing in front of the patient, picking up the limb and rotating the distal end outwards and backwards, whilst the practitioner presses the head of the humerus inwards. If this method fails, the animal must be cast on the sound side. The trunk should be fixed by a stout rope passed round the chest and tied to a fixed object, or to a crowbar driven deeply into the ground behind the withers. A rope is now fastened to the foot, which is pulled by several men in a line perpendicular with the body axis, or a set of pulley blocks may be used for the same traction purpose, while the operator presses the head of the humerus downwards. If the force is sufficient, the bone usually goes into position with a crack. In the dog reduction is usually easy. The after-treatment consists of keeping the animal quiet and the application of a smart blister or a stiff pitch plaster.

Fetlock.—"Knuckling over" of the fetlock-joint, as seen in practice, is a form of dislocation met with in horses. It may be the cause, as well as the result, of contraction of the back tendons. A partial dislocation is sometimes seen in animals running on hillsides, badly fed, and out of condition. In these cases better food and a run on level ground, with the application of a blister, usually effects a cure. Where the tendons have become shrunk, tenotomy is indicated. In obstinate cases, and where the back tendons are not involved, line firing all round the joint tightens the skin and thereby gives considerable support to the joint. Whatever may be the cause or the complication, the heels should be cut away as low as possible, and a shoe having a projecting toe-piece applied.

Hip—The principle of reduction here is similar to that laid down for dislocation of the shoulder. The condition is most commonly seen in the ox and the dog.

Patella.—Where the luxation is of old standing little can be done, unless the patient is a young animal, when it should be housed, fed on rich food, and repeated blisters applied. In some cases, owing to the wearing away of the trochlea, the animal is liable to reduce the displacement itself during locomotion. Where the patella is out and the limb is rigidly fixed in a backward direction, a rope should be placed round the pastern and forcibly drawn forward, whilst the operator firmly grasps the tail with one hand, and with the palm of the other forces the patella inwards, reduction taking place with a click. To prevent a recurrence, the patient must be tied up short in a stall, and the affected limb drawn forward and kept in that position by a rope fixed round the pastern, carried forward between the fore legs, and tied round the neck. To strengthen the tendinous elements of the joint a blister should be applied.

To the younger practitioner dislocations in the horse and the ox often present considerable difficulties, on account of the strength of the muscular elements. These may be overcome by placing the animal under an anæsthetic. This procedure is in many cases good practice, and is to be commended. Further, it must be pointed out that in the case of young animals excessive force exercised on the part of the operator to overcome the muscular antagonism of the patient may result in fracture of a long bone at the epiphysis, anæsthesia reducing this risk to a minimum.

DISTEMPER, CANINE.

In the light of present-day knowledge there can be no doubt that distemper in the dog is caused by an ultramicroscopic virus. This organism, as far as we know, does not in itself appear to be a highly fatal one; nevertheless, distemper must be looked upon as a serious and fatal disease, on account of the complications which often accompany or follow an attack. These are due to the aggressive action of secondary bacteria, which find the defensive body elements so broken down by reason of the ultramicroscopic virus that these organisms not only find an easy footing, but also their breeding-ground is so suitable that they gain in virulence as they pass from one infected patient to another. A great number of organisms have been isolated from the systems of affected animals; thus, the broncho-septicus of Ferry, staphylococci, streptococci, diplococci, Pasteurella, and *B. coli* have been found in the respiratory, gastro-intestinal, circulatory, cutaneous, and nervous systems. The practitioner's attention is usually directed to the case when the symptoms caused by secondary infection have set in; consequently, no rule-of-thumb treatment can be outlined or followed. Each individual case or outbreak must be treated on its own merits. Treatment falls under two heads—prophylactic and curative.

Prophylactic.—When dealing with a number of dogs, or a kennel of hounds, the affected animals, on the first indication of disease, must be segregated from the healthy and the surroundings thoroughly disinfected. All our available knowledge of active and passive immunization must be introduced and freely used upon the healthy animals—*i.e.*, the injection of polyvalent strains of all secondary bacteria found in the outbreak in conjunction with their corresponding antisera. Autogenous vaccines are infinitely preferable to stock vaccines. The writer confesses that this treatment savours somewhat of placing " the cart before the horse," inasmuch as the immunizing elements are only intended to act upon those bacteria which are known to cause the complications, leaving the *prima facie* cause, the ultramicroscopic virus, untouched, so to speak. On this point it appears to the writer that a hyperimmune serum might be procured by bleeding to death a dog suffering from distemper *in the early stages*,* and injecting the serum thus procured in regulated large doses into the horse, and from this animal securing a serum rich in immune bodies. The questions would then arise, Would this serum contain specific immune bodies? If so, how long would hyperimmunity last? If the serum answered the first question in the positive, the second question would in all probability be answered in practice, and a more or less *lasting* immunity conferred, when it is remembered that one *natural* attack of distemper usually confers a lifelong immunity. In vaccinating dogs against distemper, it is advisable to see that they are removed from all sources of infection while under active immunization. Their surroundings should be of the healthiest, and the diet light, digestible, and nutritious. The writer has in some cases obtained excellent results in large kennels by immunizing the bitches in the early stages of pregnancy with vaccines prepared from *materiès* taken from patients themselves infected in the same kennels, a high degree of immunity being thereby transmitted to the offspring.

Curative.—This may be divided into two heads—chemical and biological, but at the present neither are specific, and so far as the former is concerned, treatment is largely symptomatic.

Chemical.—It must be remembered that the disease is microbian from beginning to end, that its course cannot be cut short when once established, and that the principal factors towards recovery are the patient's own resources. These latter must be fostered and replenished in every possible way. With the growth of bacteria, toxins form, and if these are not eliminated, auto-intoxication sets in, as seen in some cases of distemper where dogs die before advanced symptoms of the disease have time to develop. Toxins must therefore be got rid of by the quickest channels—the bowels, the kidneys, and the skin—and the writer knows of no better agent than sodium salicylate, 5-grain doses every four or five hours, combined with a single dose of ½ to 1 ounce medicinal paraffin. The above salt also appears to neutralize as well as assist in eliminating the toxins. When the bacteria and their products have so depressed a certain set of organs, such as the respiratory, the gastro-intestinal, the nervous or hepatic, so will the various symptoms manifest themselves, and indicate the line of treatment to follow.

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* It is just possible that the filter-passing organism soon becomes annihilated by the onrush of the secondary bacteria and their toxins.

When respiratory symptoms predominate, medicated inhalations of eucalyptus, terebine, carbolic acid, etc., are indicated, and camphor liniment should be well rubbed into the chest and throat. If the cough proves irritable, the following is advised:

℞ Glyco-Heroin
Syrupus Scillæ } .. .. āā ♏xx.
Olei Olivæ
M. Ft. haust. To be given three times a day.

If there is a high temperature, 5-grain doses of aspirin or salicylate of soda should be added. Or—

℞ Vini Ipecacuanhæ
Vini Antimonii } .. .. āā ♏x.
Tincturæ Camphoræ .. .. .. ♏xx.
Glycerini .. .. ♏xxx.
M. Ft. haust. Give one teaspoonful three times daily.

Where symptoms of bronchitis or pneumonia set in, these conditions should be treated on the lines laid down for those special diseases. Where gastro-intestinal irritative symptoms are in evidence, an emetic should be given if the patient has not already been sick—ipecacuanha 20 to 30 grains or ½ dram each of salt and mustard in 2 ounces hot water proves effectual, after which a dose of medicinal paraffin or salad oil should be given. This irritability being due to bacteria and their toxins, endeavours should be made to allay the catarrh and make the alimentary canal as unsuitable for their growth as possible by the use of the following:

℞ β-Naphthol .. .. grs. iii.
Ingluvin
Bismuthi Carbonatis } .. .. .. āā grs. v.
Sodii Bicarbonatis
M. Ft. pulv. One to be given three times a day in a little warm milk.

Or liquor pepsini cum bismuthi co. may be prescribed in ½-dram doses with advantage three times daily. If the bowels are very relaxed and strongly alkaline, teaspoonful doses of a 2 per cent. solution of lactic acid every three or four hours has given the writer good results, and this may be alternated with 5 grains of acid. boric. dissolved in ½ dram of glycerine.

Where the fæces are foul, the following is indicated:

℞ Hydrargyri Subchloridi	gr. $\frac{1}{10}$
Resorcini	grs. ii.
Tincturæ Opii	♏iii.
Tincturæ Cardamomi Co.	♏v.
Dill Water	q.s. ad ʒi.

M. Ft. haust. One teaspoonful to be given three times a day in an ounce of well-boiled rice water.

Or—

℞ Liquoris Hydrargyri Perchloridi	♏v.
Tincturæ Opii	♏iii.
Aquæ Chloroformi	ʒi.

M. Ft. haust. To be given as above.

Where the disease appears to attack the large bowels, and the fæces contain much mucus streaked with blood, the passage of which causes the patient to strain excessively, there is no better combination than ipecacuanha and opium:*

℞ Vini Ipecacuanhæ	♏v.
Tincturæ Opii	♏ii.
Aquæ Cinnamomi	ad ʒi.

M. Ft. haust. One teaspoonful three times a day in starch or arrowroot gruel.

Starch or dilute tragacanth mucilage enemas with a few drops of laudanum relieve tension and often prevent prolapsus recti. Gray recommends the following for obstinate and persistent diarrhœa:

℞ Infusi Caryophylli Decocti Hæmatoxyli Acidi Sulphurici Aromatici	āā ʒiv.
Syrupus Zingiberis	℥ii.
Aquæ Chloroformi	q.s. ad ℥vi.

M. Ft. mist. One teaspoonful to a tablespoonful three times a day.

When the acute stage is abating, pepsin, bismuth, and charcoal, each in 5-grain doses after food, soothe and stimulate the digestive system, together with a course of cod-liver oil and malt extract, which will be found beneficial. In the nervous form of distemper, prognosis can only be of the gravest kind. If treatment is decided on, the following may be tried. It has given the writer the best results:

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* See also Dysentery, p. 133.

℞ Strychninæ Arsenatis	gr. $\frac{1}{70}$
Codeinæ Phosphatis	gr. $\frac{1}{2}$
Aquæ Chloroformi	ad ʒi.

M. Ft. haust. One teaspoonful to be given three times a day in a dessertspoonful of cod-liver oil and malt extract.

See also treatment for chorea.

A course of syrup of hypophosphate co. may be tried, beginning with the minimum dose, but care must be taken that this drug is not given on an empty stomach. Where there are indications of effusions on the spine, the system should be saturated with potassium iodide. If there is much irritability, 5-grain doses of sodium bromide are indicated. Where hepatic complications predominate, a calomel and podophyllin pill should be given at the beginning, followed by 5-grain doses of aspirin three times a day. Massage over the hepatic region frees the gall-bladder and bile-duct of excess of viscous bile, and 10-grain doses of citrate of soda three times daily, also helps to keep the bile fluid. The writer, in addition, places the greatest reliance on the injection over the right and left shoulder alternately of normal saline solution, 50 to 500 c.c., added to which is 1 grain of proflavine and 5 grains of sodium citrate. If there is great prostration, 10 to 60 minims of brandy, according to the size of the dog, may be added to the solution. In some cases, however, the disease takes on such a severe aspect that all treatment is hopeless from the beginning. Where the blood tends to become plastic, especially in the pulmonary type, it should be charged with decalcifying agents:

℞ Potassii Iodidi Sodii Citratis	āā grs. v.
Aquæ Chloroformi	ʒi.

M. Ft. haust. One teaspoonful three times a day.

Where the heart shows signs of weakening consequent upon the toxæmia, cardiac tonics and stimulants are indicated, combined with the subcutaneous injection of saline solution alternated with camphor oil. In some cases sodium cacodylate injected daily in 2 to 5 grain doses appears to act beneficially.

For a large dog :

℞ Liquoris Strychninæ Hydrochloridi	♏ii.
Digitalin	gr. $\frac{1}{50}$
Sparteinæ Sulphatis	gr. $\frac{1}{2}$

M. Ft. injectio. To be given early in the morning and late at night.

Brandy may also be given at intervals, and the inhalation of oxygen is to be commended. In addition to the foregoing, ulcerative sloughing of the lips, gums, tongue, etc., is by no means uncommon, and for this mouth washes of boric lotion, permanganate of potash, peroxide of hydrogen, and the hypochlorites, are all useful. Corneal complications also sometimes supervene, for the treatment of which see Conjunctivitis. As a routine measure every distemper case should have 30 to 60 grains of common salt daily. Finally, in those cases where the responses are feeble or apparently absent, the writer considers a deficient leucocytosis is the cause in the majority of instances, and has obtained encouraging results by producing a fixation abscess—*i.e.*, by injecting 1 c.c. to 2 c.c. turpentine *subcutis* in the scapula region.

Biological.—When an animal is suffering from distemper the vital forces are at a low ebb; the opsonic, agglutinin, precipitatin, bacteriolysin, and other indexes, have all been clearly depleted; therefore a specific serum containing all these to replace the deficiency is the ideal line of treatment, but a reliable, composite serum to antagonize the ultra-microscopic virus is, so far as the writer is aware, non-existent. For the secondary bacteria a *B. coli* and streptococcal antisera is procurable. It is important to point out passive immunization—*i.e.*, serum therapy—gives no negative depressing phase, whereas active immunization—*i.e.*, vaccine therapy—does, and it is this phase which the patient sometimes fails to withstand. Of course, he may be safeguarded against it to a certain extent by beginning with very small doses of vaccine, and this practice the writer advises, especially in the case of very prostrate patients. Stock vaccines, to possess full therapeutic effect, must contain dead cultures of all the bacteria present, and this is not always possible, for no two outbreaks are identical. Clearly, then, *autovaccines* hold out the most scientific prospect for good results; but as these take a few days to produce, it is advisable to give the patient or patients a dose of a reliable stock vaccine at once. In some outbreaks, before the practitioner is called in, several secondary bacteria may be in evidence at the beginning, but in accordance with the principle of the survival of the fittest a stage is often reached when only one, or perhaps two, species hold the field, and these may have become so virulent as to produce a very vicious circle. It is quite evident that it is *on them* the immunizer must concentrate his energies.

Management and Diet.—Under the régime of common sense, good management, and suitable dietary, many a case of distemper will recover without additional treatment. To thwart the risk of secondary complications, the patient should be placed in the most sanitary and comfortable surroundings possible. An abundance of sunlight and fresh air, without draughts, should be aimed at, and the body temperature maintained at normal heat, if necessary, by the use of rugs. The kennel should have surface drainage with *outside* traps, the floor and bench washed regularly with a disinfectant solution, and the stools removed as often as necessary. A daily grooming of the skin with a medium body-brush has a stimulating and salutary influence upon the whole system A light and easily digested diet is necessary. Milk is the most nutritious foundation for all, and, failing gastro-intestinal complications, raw milk is preferred to boiled. In some cases Glaxo appears to suit the patient better, and may be used instead of ordinary milk. For the first week or so no solid food should be allowed, but the patient may have a large meatless round bone to nibble. Whichever form of diet is ordered, due regard must be paid to the important point of not overloading the stomach and upsetting digestion, particularly where alimentary complications are in evidence. Often lay attendants thrust rich nutrients upon their patients, with the object, as they aver, of "keeping up the strength," whereas they are in fact adding fuel to fire by giving the animal food it cannot digest, and in this state it reaches the bowels to act as a pronounced irritant, setting up an aggravation of the catarrh, stimulating fermentation and bacterial development, with consequent auto-intoxication and a general lowering of the health index. Where the digestive system is involved, even *boiled* milk may prove too indigestible, as evidenced by the fact that the stools contain curd and sometimes blood. In these cases lacto-peptin should be given, and freshly made rice water substituted for the milk. Arrowroot, cornflour, and rice gruels, well cooked, are also useful, and, later on, mutton or chicken broth may be strongly recommended. The writer questions the value of the various meat extracts as a general rule, and would go even further and give the opinion that more cases are lost through the excessive use of these preparations than many realize. Where milk appears to be unsuitable in itself, the addition of a little lime water adds to its digestibility. If the case progresses favourably, in due course a little fish, breast of a fowl, scraped mutton, tripe, and sheep's paunch, may be allowed. Boiled rabbit, and rabbit broth, can also be recommended Some dogs are fond of rusk biscuits, arrowroot biscuits, and crusts of white bread baked brown in the oven; all these are very digestible. During the course of the illness, and also during convalescence, the attendant should use his discretion in making the patient's diet within the above prescribed lines as variable as possible. This, in itself, is a distinct aid to digestion.

DISTOMIASIS. *See also* **Parasitic Diseases.**

Prophylactic Treatment.—On sheep-farms infected with this disease, the land, where practicable, should be cultivated, especially if the pasture is old. If low-lying and wet, thorough drainage is advisable, and a top dressing with lime, soot, and salt is beneficial. The sheep should be moved from pasture to pasture as often as possible, and if they can have a run on the hillside, so much the better. Additional food should also be allowed—hay, oats, bran, cake, meal, etc. The trough food should be sprinkled with common salt; rock salt does not admit of the sheep licking a sufficient quantity to be of any therapeutic value. In the early stages of the disease both sheep and cattle tend to improve in condition, owing to increased hepatic functional activity, after which a period of systemic wasting sets in, in consequence of organic disintegration, and before this stage is reached it may be considered economically advisable to slaughter the flock. Special care must be taken to cremate the livers of all animals found dead or slaughtered.

Curative Treatment.—Marek, in the *International Bulletin of Agriculture*, 1916, reports favourably upon the employment of Kamală. For sheep twelve months old he advises 15 grammes in two doses during a period of twelve to twenty-four hours, and double the dose for matured robust sheep. The writer, in the wet autumn of 1917, used very extensively *ethereal extract of male fern*, both for young cattle and sheep, on the principle suggested by Moussu and others, with most gratifying results. Many of the cases were in an advanced stage of the disease, and in cattle particularly the results seemed astonishing. Opportunities sometimes occurred of examining the livers of cases killed by the butcher, and that organ was frequently found to be shrunken and cirrhotic, the bile ducts calcareous, and yet not a single fluke was to be found. Others in the advanced stages, when down and unable to stand, were destroyed, and post-mortem examinations, though revealing the pathological phenomena of fluke disintegration, showed an almost complete absence of the fluke itself. The opinion based upon these observations is that if the outbreak is taken seriously in hand in the early stages, every fluke can be driven from its habitat, and the patient restored to good health. A word of warning must, however, be given. The active principle of the extract—*i.e.*, *filicic acid*—varies to a great degree, and the practitioner must see that the minimum percentage of acid is not below 3 to 5 per cent. As that percentage falls, so does the therapeutic value of the drug. The extract should only be procured from a reliable firm, and the strength of acid guaranteed. The dose for the ox, according to size and condition, is from 10 to 20 grammes, and for the sheep 3 to 5 grammes, given every morning fasting, for five consecutive days in 1 to 2 ounces of linseed oil. While under treatment the animals should, of course, be placed on the most nutritious diet possible.

DISTORTION (NECK).

This condition is usually accidental, and is most commonly seen in the horse. It is almost invariably due to the hind leg or foot becoming entangled in the halter rope, the animal trying to liberate himself until injury to the neck takes place. These accidents usually happen overnight, and are detected by the attendant in the morning. The horse's head is generally hanging near the ground with a lateral twist, the neck being convex on one side and correspondingly concave on the other. Where the head is depressed it should be raised and supported by a double rope fixed to the halter and tied high up to the rack. The neck can usually be straightened, but tends to slip back again into its curved position. To obviate this, an iron splint should be placed on either side of the neck (as used in dislocation of the neck) and kept in position by iron hoops passing over the mane. In mild cases, under hot fomentations and the application of stimulating liniment massaged into both sides of the neck, a gradual straightening takes place as the muscular tone is restored to the parts. Occasionally a case is seen where replacement of the neck is difficult; in such cases two or three assistants should be ordered to pull the halter rope, another bringing pressure to bear upon the head at the opposite side, while the practitioner uses all his force against the convexity. The writer prefers to place all cases of distortion of the neck in slings from the outset.

DOCKING.

This is a minor operation, and should be performed when the animal is young. A local anæsthetic is injected into the tail at several points above the seat of amputation. In the case of the horse the hair should be parted in a circular ring, preferably over a joint, and the hair above the ring plaited. A ligature of string is then tightly applied to the tail above the seat of operation. The animal is twitched, the tail is held straight out by an assistant, and the operator, standing on the left side, amputates with a docking knife. The stump is then seared with a hot iron made for the purpose, or it may be dressed with an antiseptic, covered with cotton-wool, and bandaged, the ligature being left on for twelve hours. In the case of the puppy or dog, the tail may be amputated with a strong, sharp knife or forceps, the skin before amputation being drawn upwards to the root of the tail, the object being to prevent the bony stump from projecting beyond its cutaneous covering. After amputation the stump is dressed, covered with cotton-wool, bandaged, and left *in situ* for a day or two.

DOURINE.

Complete recovery may be said to be rare. No curative treatment has so far proved successful. Arsenical compounds and other therapeutic agents employed in the treatment of trypanosomiasis may be tried.

The disease should be dealt with by legislation, and infected animals destroyed, or, as an alternative, coition prevented, the castration of infected males being made compulsory.—*G. K. Walker.*

DROPPED ELBOW.

This condition is caused by paralysis of the radial nerve, due to stretching of the nerve or to direct injury, consequent upon fracture of the first rib. This latter condition is an added complication seriously retarding recovery and necessitating a guarded prognosis. Where the nerve is simply stretched, with subsequent muscular atrophy as a result, massage of the shoulder and limb, the application of stimulating liniment, blisters, galvanism, may be tried in rotation, with enforced rest. The writer places no reliance on the internal administration, either *subcutis* or *per oram*, of such agents as strychnine or veratrin, but the subcutaneous injection of normal saline solution over the scapular region has given satisfactory results in several cases. In those cases where fracture of the first rib is present, slinging is advised for a month, after which the patient is repeatedly blistered and a long run at grass ordered. If this fails, setoning the shoulder may be tried (see Setons); but in the event of negative results the patient should be destroyed.

DROPPING OF THE CUD.

This is invariably a symptom of stomach derangement. The stomach and bowels should be unloaded by a smart purge, and, in the case of the ox, 1 pound treacle and 1 pound sodium sulphate dissolved in a quart of warm water may be followed by a stomachic tonic:

℞	Pulveris Nucis Vomicæ	ʒss.
	Pulveris Gentianæ	ʒii.
	Pulveris Sodii Bicarbonatis	℥i.

M. Ft. pulv. One powder to be given night and morning in a quart of flax gruel.

DROPSY.

The Abdomen.—Of all the domestic animals, the dog is the most common victim of this condition. Occasionally it occurs in the horse, seldom in the ox, and sometimes in the cat. Where grave organic disease exists in the heart or portal system of the liver, treatment can only be palliative. The animal must be placed upon a rich, dry, concentrated diet, and little water allowed. Potassium iodide, iron, turpentine, and oil of copaiba, are preferably the most useful drugs. In obstinate cases tapping should be resorted to. The skin is sterilized with tincture of iodine or iodized petrol, and a sterile trocar and canula inserted while the patient is in a standing position. Should the fluid stop flowing, a knuckle of bowel or a piece of mesentery is obstructing the tube, which should be rotated about to disconnect the union. If this fails, a sterile stilette must be passed up the canula. Most authorities assert that it is dangerous to withdraw the fluid rapidly. Personally the writer has never experienced any danger, and never hesitates to remove it quickly, and always makes a point of giving it to the patient *per oram* afterwards. As a nutrient it is most valuable, and in addition the fluid contains other complex bodies of which we know little, but which, nevertheless, are important assets to the body metabolism. The tapping operation should be repeated as often as necessary. It has been suggested by some authorities that tincture of iodine may be injected into the abdominal cavity after the removal of the fluid, but it is difficult to see the logic of such a procedure, fraught with so much danger. Surgeons operating upon the abdomen are now discarding tincture of iodine for sterilizing the skin, owing to the risk of the visceral peritoneum coming in contact with it, and plastic adhesions being almost sure to follow, to the detriment of the patient. If any preparation requires to be injected at all, theoretically speaking, a sterile solution of a calcium salt is surely indicated.

The Amnion (Hydrops Amnii).—This condition is seldom met with in any animal except the cow, and the subject is always in poor condition. As soon as the diagnosis is made, *premature delivery* should be obtained. The fœtal membranes are tapped by the passage of a sterile trocar and canula through the os uteri. In one to three days labour pains will come on, and as soon as the os has become sufficiently dilated the fœtus may be delivered. After-treatment consists of giving the best food, oats, cake, bran, etc., with tonic medicine—iron, nucis vomicæ, and gentian—three times a day; and as there is a lowering of the calcium content of the blood in these cases, the administration of lime salts is called for. In the writer's opinion, in many instances, hydrops amnii is primarily due to a *deficient calcium content.*

The Chest (Hydrothorax).—Where fluid is found in the chest cavity to the extent of occasioning no inconvenience, a course of aperient, diuretic, or diaphoretic medicines is indicated, such as soda sulphate, potassium nitrate, and liquor ammonia acetate, salicylate of soda, or potassium iodide in appropriate doses. Where there is pronounced evidence of fluid, daily tapping should be resorted to on alternate sides of the chest. The site of operation is the intercostal spaces between the fifth and seventh ribs, allowing for eighteen ribs and counting forward from behind. The writer makes a point of injecting in the horse subcutaneously 50 c.c. of the fluid after removal, for in many cases it carries with it specific elements (see also Puncture).

The Limbs.—In some animals of a phlegmatic constitution standing in the stable for any length of time, the hind legs and the sheath often swell, this being due to subcutaneous effusion. The same condition is also seen in debilitating diseases, such as influenza, irregular strangles, anæmia, and parasitic diseases. Gentle exercise and the administration of tonics and diuretics are indicated:

℞ Ferri Sulphatis	ʒi.
Pulveris Nucis Vomicæ	ʒii.
Potassii Nitratis Calcii Carbonatis }	āā ℥ss.

M. Ft. pulv. One to be given three times a day in manger food, or in a pint of barley gruel.

Well-cooked barley gruel should be ordered instead of drinking water.

The Pericardium (Hydrops Pericardii).—When this condition is sufficiently established for the clinician to detect it, organic changes of the first importance have already taken place, leaving the chances of recovery through the skill of the practitioner very remote indeed. Tapping the pericardial sack may be tried as a last resort (see also Puncture).

DYSENTERY.

This disease is most common in the ox and dog. The writer has only met with two outbreaks in equine practice. In one case the cause was sewage water, and the other the contamination of pasture-land by the overflowing of the banks of a salt-water tidal river. In the first outbreak six horses were affected, of which three died. In the second, nine horses and colts were attacked, of which five died. The treatment consisted of the administration of ipecacuanha, opium and cinnamon, 1 dram each, in a quart of equal parts of flour and starch gruel and six eggs every five hours. Each animal had ½ pint of linseed oil and 2 drams of boric acid at the beginning. In the latter outbreak each patient had in addition 3 grains of emetine daily, hypodermically administered. In cattle practice alternation of 2-dram doses of ipecacuanha and opium with ounce doses of soda sulphate combined with 2-dram doses of acid. sulphuric. aromatic. will be found beneficial. The diet should be light and digestible; bran and bean meal, oats, hay, and roots should be withheld, but grass, if not too succulent, may be allowed, mixed with hay chaff; drying the grass in the sun before use overcomes succulency. Thick flour gruel should take the place of drinking water. In dogs dysentery is no uncommon sequel to distemper, and the patients suffering from this complication require most careful attention, for as a rule a debilitating diarrhœa has been the usual forerunner. The writer has obtained better results from the following combination than from any other in these cases:

℞ Argenti Nitratis	gr. $\frac{1}{4}$
Tincturæ Ipecacuanhæ	♏iii.
Tincturæ Opii	♏i.
Glycerini	♏x.
Aquæ..	q.s. ad ♏xxxv.

M. Ft. haust. One teaspoonful to be given in starch gruel three times daily. To this may be added, if the stools are offensive, $\frac{1}{10}$ grain of calomel.

Astringent anodyne enemas given with a long tube often act as a useful adjuvant, such as 20 grains of boric acid, 30 minims of tincture of opium, $\frac{1}{2}$ ounce of lime water, and 3 ounces of well-boiled starch gruel. This should be injected slowly into the rectum, and as far up into the intestines as possible, the hind legs being raised and the animal kept in this position for several minutes. The diet should consist of one part milk, one part well-cooked rice water, and one part well-boiled arrowroot. Meat must be withheld, but rabbit or mutton broth may be allowed with advantage. Where digestion is very weak, Mellin's food and lacto-pepsin or ingluvin may be given, and later on Glaxo will be found beneficial.

[**Dysentery in the Camel.**—Dysentery in the camel is met with—(1) in camels suffering from rinderpest; (2) as the result of eating poisonous plants; (3) being fed on bad fodder.

When occurring as the symptom of a disease, the treatment necessary for that disease must be followed.

When due to eating poisonous plants, the administration of a purgative —*e.g.*, sulphate of magnesia in 2-pound doses—is indicated, combined with sedatives such as chlorodyne or camphorodyne in 4-ounce doses, and followed by demulcents—*e.g.*, linseed tea, milk, eggs, rice gruel, etc.

When due to bad fodder, the fodder must at once be changed, and mag. sulph. combined with chlorodyne administered.

The administration of chlorodyne after the sulphate of magnesia should be continued daily in doses of 3 ounces for three or four days. In the majority of cases a cure is effected within three or four days.

Water should be allowed *ad lib.*, and the best fodder provided. If the weather is cold, the animal should be well rugged and kept warm. —*H. E. Cross.*]

DYSPEPSIA.

This condition may be acute or chronic. In the former the state is largely catarrhal and functional; in the latter it is usually organic. Where possible, the cause should be ascertained, but this is not always easy (in practice). Where an excess of acid exists in the stomach, antacids are indicated—chalk, bismuth, carbonate, magnesium carbonate, sodium carbonate. These should be given before meals. Where hydrochloric acid is deficient, infusions of quassia with acid. hydrochloric. dil. are indicated, combined with pepsin, and given after meals. Where a want of tone exists, tincture of nux vomica, tincture cardamomi co., and infusion of quassia, often give good results. The following prescriptions on the above lines are recommended:

Acid Dyspepsia.—

For the horse :

℞	Bismuthi Carbonatis	ʒii.
	Sodii Bicarbonatis	āā ℥ss.
	Cretæ Preparatæ	

M. Ft. pulv. One to be given night and morning before meals.

For the dog :

℞	Bismuthi Carbonatis	grs. v.
	Sodii Carbonatis	āā grs. xx.
	Magnesii Carbonatis	

M. Ft. pulv. One to be given night and morning before meals.

Antacid Dyspepsia.—

For the horse :

℞	Acidi Hydrochlorici Dil.	ʒi.
	Infusi Quassiæ	℥vi.

M. Ft. haust. To be given half an hour before meals twice daily.

For the dog :

℞	Acidi Hydrochlorici Dil.	♏x.
	Glycerini Pepsini	ʒi.

M. Ft. haust. One teaspoonful to be given before meals twice daily.

Atonic Dyspepsia.—

For the horse :

℞	Tincturæ Nucis Vomicæ	ʒii.
	Infusii Quassiæ	āā O.ss.
	Infusii Gentianæ	

M. Ft. haust. To be given before meals twice daily.

For the dog :

℞ Tincturæ Nucis Vomicæ .. .. .. ♏iii.
Tincturæ Cardamomi Co. .. .. .. ♏xviii.
Infusi Gentianæ .. .. ad ♏xxx.

M. Ft. haust. One teaspoonful to be given after meals.

The above may be alternated with the mixture of pepsin cum bismuth co.

In cattle practice, to unload the stomach by giving a laxative, magnesium sulphate and treacle, followed by a simple tonic and antacid, gentian and soda bicarbonate usually effects a cure. If atony of the walls exists, ½-dram doses of nux vomica and 2 drams of ginger often prove effectual.

Diet.—This is an important factor, not only in the cause of dyspepsia, but also in the prevention and cure. In the horse and ox, bad hay, fusty oats, mouldy cake, decomposing and frosted roots, are common causes of indigestion. Where an animal is suffering from indigestion, clearly the food should be of the lightest and most digestible kind. Bran, crushed oats, and steamed hay, are an ideal diet for horses and cattle. For the dog, well-boiled sheep's paunch, tripe, fish, fresh milk puddings, and clear soups, are advised. If the animal is a gross feeder, the meals should be small and often repeated; and if any irregularities of the teeth exist, these must be attended to before treatment is adopted.

Dyspepsia in Young Foals and Calves.—The loss to breeders by mismanagement of their young foals and calves, primarily through indigestion and their sequelæ, can only be truly gauged by those practising in breeding districts. In the case of hand-reared calves the losses are notorious, and are largely due to two reasons—(1) The unhygienic state of the milk by the time it reaches the animal; (2) allowing an animal to drink too much at a time, instead of giving the food at frequent intervals and in smaller quantities. Counteract these and many lives would be saved which are now lost. As regards the first reason, one must remember that milk is an excellent medium for bacteria to grow upon; it must therefore follow that the milk should not only be collected in perfectly clean and sterile vessels, but it must be placed in an atmosphere as nearly free from floating bacteria as possible. To have a dairy the window of which looks out on to a manure-heap or a drain-trap of some sewage-pipe is detrimental to the purity of the milk-supply. As for the second reason, most calves are hand-fed two or three times a day, the result being that at each feeding they have too large a volume of milk given them at a time. The stomach wall is unusually dilated, producing atony and consequent diminution of the secretion of gastric juice. When the calf sucks naturally from the mother, there are formed small pellets of curd on the milk reaching the acid of the stomach, the result being that these small masses of curd undergo easy digestion. In hand-fed calves a large mass of curd tends to form, making digestion difficult and delayed, and retrogressive changes take place in the central part of the curd forming a focus of bacterial growth, which in turn act upon the gastro-intestinal mucosæ, setting up acute indigestion, gastro-enteritis, diarrhœa, dysentery, and often ending in death. In the treatment of dyspepsia in foals and calves, effete material lodging in the alimentary canal must be cleared away by the use of aperients, and some preparations of oil offer the best results; medicinal paraffin or salad oil are to be preferred, as both these carry with them antiseptic properties. Then, it must be remembered one is fighting against virulent bacteria inhabiting the digestive tract, which, by the way, has not acquired a natural hyperimmunity against auto-intoxication and auto-infection, as may be the case when an animal reaches maturity. The contents of the digestive apparatus must therefore be made as unsuitable for bacterial growth as possible by the free use of antizymotics, such as the following:

℞ Acidi Borici	grs. xx.
Sodii Bicarbonatis Cretæ Preparatæ	āā ʒii.
Glycerini	ʒi.
Aquæ	q.s. ad ℥ss.

M. Ft. haust. One tablespoonful three times a day in 4 ounces of well-boiled flax gruel.

Or—

℞ Salol	grs. xx.
Bismuthii Subnitratis	grs. xxv.
Pulveris Cretæ Prep.	grs. xxx.

M. Ft. pulv. One powder to be given three times a day in gruel.

Or—

℞ Resorcini	grs. xx.
Tincturæ Rhei Compositæ	♏xxx.
Liquoris Pepsini	ʒi.
Aquæ Menthæ Pip.	q.s. ad ʒii.

M. Ft. haust. Two teaspoonfuls to be given three times a day.

Where atony exists, the following may be recommended:

℞ Tincturæ Nucis Vomicæ	♏xv.
Acidi Hydrochlorici	♏xx.
Infusii Quassiæ	q.s. ad ℥i.

M. Ft. haust. Two tablespoonfuls to be given three times a day in gruel.

Diet.—The milk should be boiled and diluted with lime water and flax gruel, given often and in small quantities; 2-ounce doses of malt extract also make an excellent digestive. In the case where the offspring is living upon the dam, it may be the mother's milk which is the cause of the dyspepsia, through the irregularities of her diet or constitutional or mammary disease; these should be sought for and corrected.

DYSTOCIA.

Parturition in the domestic animals, where everything is normal and natural, is an easy physiological act, in which Nature as a rule requires little or no assistance from man to accomplish. Where, however, a condition exists which removes an expectant mother from the normal, dystocia, or difficult parturition, follows. In practice these vary from slight to serious, and for purposes of description may be divided into *maternal* and *fœtal*. In a work of this kind it is impossible to give more than a brief description of the irregularities encountered and the most practical means of overcoming them. Where, however, a fuller study of the subject is required, the reader is referred to standard works on obstetrics; at the same time the writer feels the treatment of dystocia is of such vital importance to both practitioner and student that it should be alluded to in this work. It must be pointed out, however, that all the descriptive treatment and diagrams will never make one a successful accoucheur. Practical experience gives manipulative dexterity, manipulative dexterity gives confidence, and confidence gives successful results.

Maternal Dystocia.

This may be due to a variety of causes: (1) Labour pains may be so slight owing to debility, hydrops amnii, ventral hernia, etc., that the mother cannot bring about delivery without assistance. (2) An abnormally small or fractured or deformed pelvis is occasionally seen in practice, in which case delivery can only be effected by embryotomy. Pelvic capacity may be also diminished by the presence of neoplasms. The writer has encountered four such cases in cattle practice. Two were operated upon and delivery successfully effected; two were destroyed, owing to the diffused nature of the growths and their apparent malignancy. Everted urinary bladder also acts as an obstruction, and this organ must be replaced before delivery is attempted. (3) Torsion of the womb is fairly common in cows, especially in those whose natural habitat is on sloping ground. It may be single or multiple, and right or left. Various operations have been suggested to overcome this condition, some of which appear to be most complicated and uncalled for. For example, it has been suggested, first, the uterus should be untwisted by an operation through the flank—*laparotomy;* and, secondly, the fœtus should be removed by an operation through the vaginal wall—*vaginal hysterectomy.* It appears to the writer that these elaborate and serious operations are quite unwarrantable in practice, when the operation of rolling the patient to undo the twist is so simple, practical, and effective in the vast majority of instances. The obstetrician, having ascertained by digital exploration the direction, right or left, and the looseness or firmness of the torsion, carefully casts his patient, for preference in a paddock, and binds the four legs securely to the trunk. With his hand inserted as far into the vagina and along the twist as possible—the direction of which has been noted as left to right twist—the patient is rolled from left to right, and the rolling must be maintained until the hand reaches the fœtus, which is then grasped. As soon as the vaginal canal becomes completely and naturally patent, delivery is effected in the usual manner. In event of rolling the patient the wrong way to reduce the twist, the surgeon will soon become aware of the fact, for he will find that the vaginal wall will tighten upon his hand, while if the rolling is in the proper direction, the twist will slacken and eventually disappear.

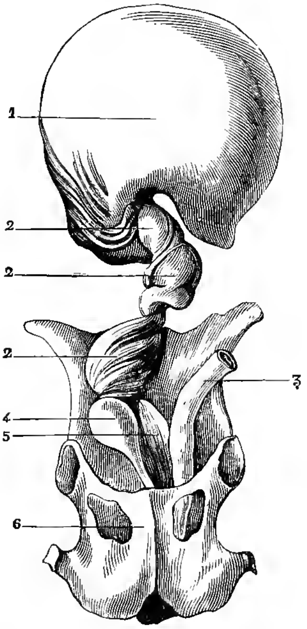

Fig. 36.—Multiple Torsion of the Uterus. (Gurlt.)

1, Body of the uterus; 2, 2, 2, torsion, involving the body of the organ; 3, rectum; 4, bladder; 5, vagina; 6, symphysis pubis.

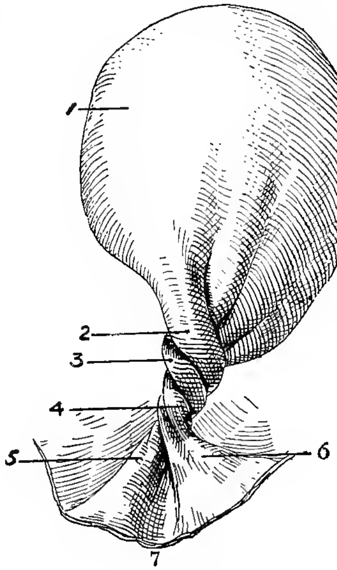

Fig. 37.—Incomplete Torsion of the Uterus.

1, Body of the uterus; 2, 3, 4, spiral twists directed from left to right; 5, cervix uteri and vagina; 6, suspensory ligament; 7, pelvis. (Fleming's "Veterinary Obstetrics.")

In scirrhous os uteri the condition is simply fibrous and not malignant; surgical interference will usually effect a safe means for delivery; nevertheless, all efforts should be made, first, to dilate the os without surgical methods by the insertion, first, of one finger smeared with carbolized oil or boric and belladonna ointment, then with two, and finally with all four fingers and thumb placed cone-shaped and steadily rotated. The os should be sufficiently dilated to admit the hand; forcible tearing of the tissues of the os by hasty delivery cannot be too severely condemned. In those cases, where simple measures fail, a sterile probe-pointed bistoury should be carried into the vaginal canal, passed through the cervix, and drawn upwards and outwards on the upper aspect and a

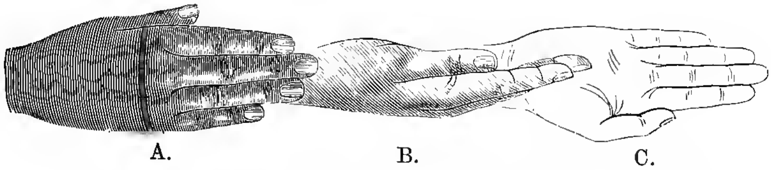

FIG. 38.—RIGHT UTERINE TORSION: MANIPULATION. (Saint-Cyr.)

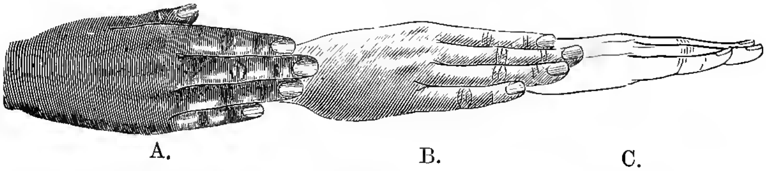

FIG. 39.—LEFT UTERINE TORSION: MANIPULATION. (Saint-Cyr.)

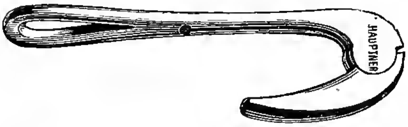

FIG. 40.—SHORT BLUNT CROTCHET, HINGED.

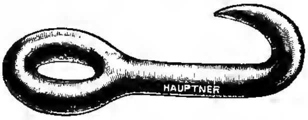

FIG. 41.—SHORT SHARP CROTCHET WITH ROUND POINT.

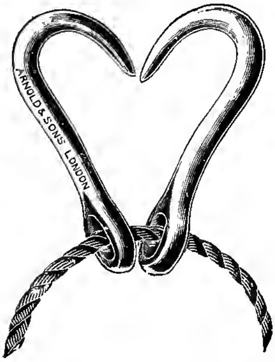

FIG. 42.—OBSTETRIC DOUBLE HOOK.

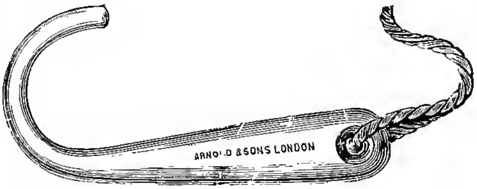

FIG. 43.—SHORT BLUNT CROTCHET.

little to the right of the mesial plane, a similar incision being made on the upper left lateral half position. Unless there is very extensive disease of the os, these two incisions will serve to allow sufficient stretching to effect delivery. If the fœtus is dead and septic, septic infection must be combated after delivery by the free use of vaginal douches, pessaries, and the daily smearing of boric ointment over the operation wounds.

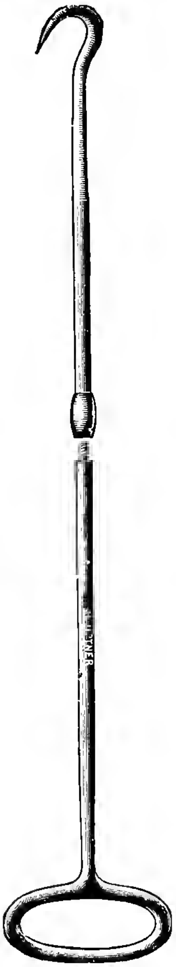

Fig. 44.—Long Pointed Crotchet for Large Animals.

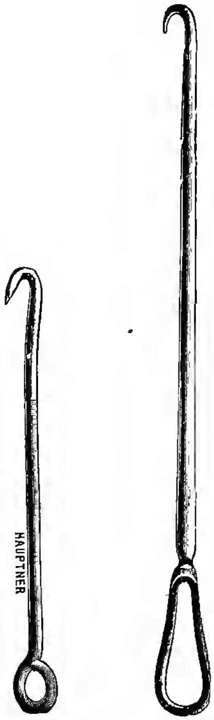

Fig. 45.—Long Pointed Crotchets for Small Animals.

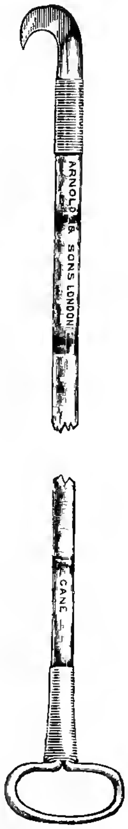

Fig. 46.—Long Blunt Crotchet.

Fœtal Dystocia.

By far the largest number of cases of difficult parturition in practice are to be found in fœtal malformations and malpresentations, but occasionally neither of these exists and yet dystocia may be present. In such cases the fœtus is abnormally large for the proportionate size of the mother, or the head may be excessively large and yet normal. These conditions are usually due to mating the dam with a sire which is recognized as throwing abnormally large offspring. In cases such as these, when steady traction has failed to effect delivery, it is safer surgery to diminish the size of the fœtus by removing one or both front limbs from the shoulder, rather than cause irreparable damage to the womb by too much forcible traction.

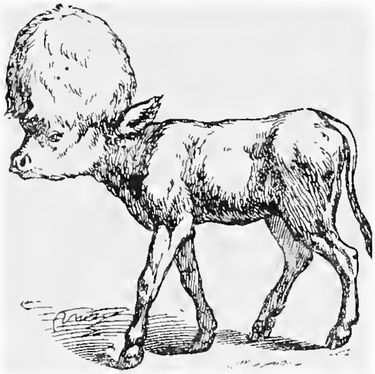

FIG. 47.—CALF AFFECTED WITH HYDROCEPHALUS. (Rueff and Baumeister.)

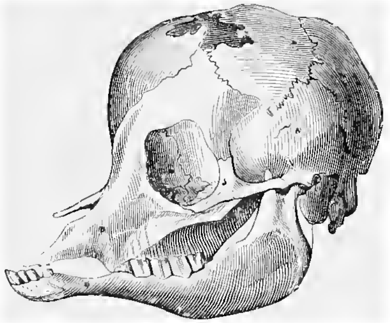

FIG. 48.—SKULL OF A HYDROCEPHALIC CALF. (Saint-Cyr.)
The cranial bones are partially destroyed and defective.

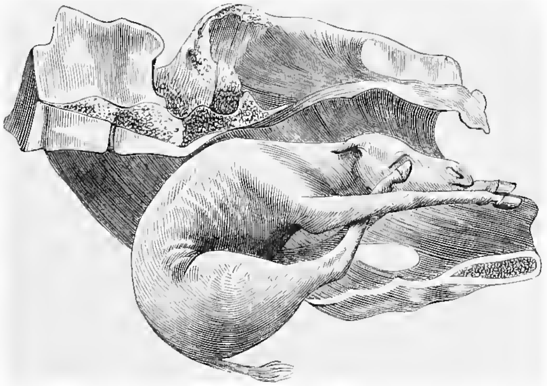

FIG. 49.—DEVIATION OF THE HIND LIMBS IN THE PELVIS IN THE ANTERIOR PRESENTATION. (Saint-Cyr.)

Malformations—*Hydrocephalus.*—If the presentation is an anterior one, the cranium should be punctured, when the fluid will escape, delivery being then usually effected with ease. If the case is a posterior presentation, efforts should be made to make it an anterior one and deliver accordingly. Failing this, and it is found impossible to effect

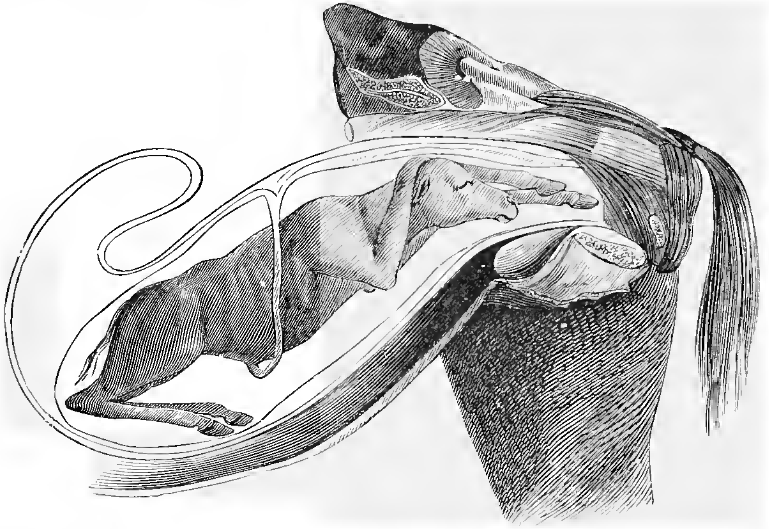

Fig. 50.—Anterior Presentation: Fore Limb crossed over the Neck. (Saint-Cyr.)

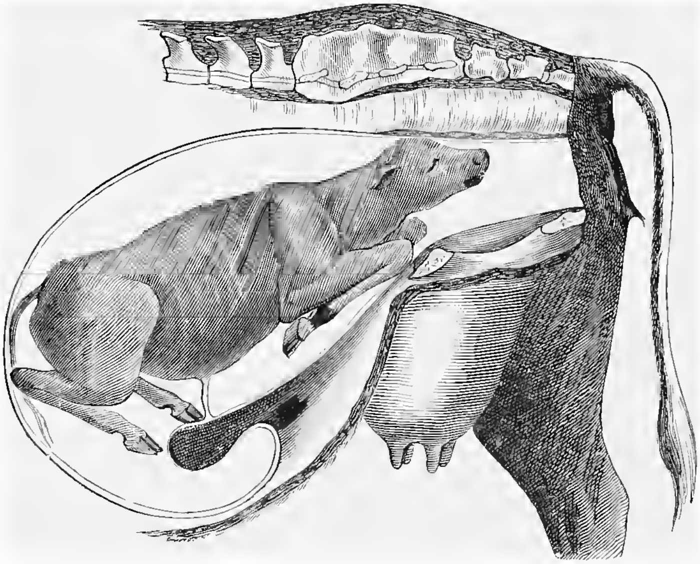

Fig. 51.—Anterior Presentation, Dorso-Sacral Position: Fore Limbs flexed at the Knees. (Saint-Cyr.)

delivery, embryotomy is the only alternative; when the head is reached, puncturing the cranium will admit of that organ being removed. In some cases of slight hydrocephalus delivery may be effected without surgical interference.

Emphysema.—This is an unpleasant condition for both obstetrician and patient, the fœtus having undergone *moist* gangrene. The skin is slashed into freely with the embryotomy knife, to allow the expulsion of gas, after which, if the presentation is a normal one, the fœtus may be extracted. As the fœtus approaches delivery, the gas is driven backwards, making a wedged-shaped obstruction, to reduce which the operator's hand, armed with a knife and well lubricated, should be passed into the vagina and fresh skin punctured as it is reached. In the after-treatment it is very necessary to carry out medicated uterine douches of peroxide of hydrogen, permanganate of potash, proflavine, in normal saline solution, etc., and if the patient seems ill and exhausted she should be given diffusible stimulants and tonics.

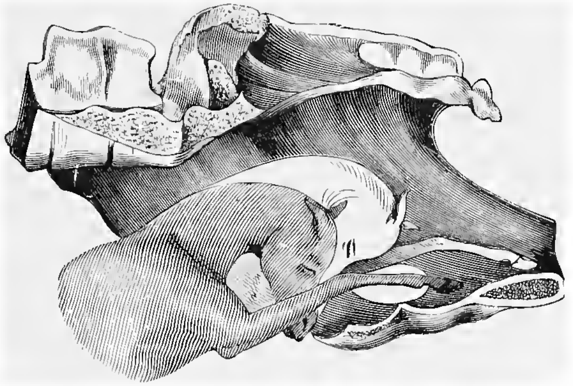

FIG. 52.—ANTERIOR PRESENTATION, DORSO-SACRAL POSITION: DOWNWARD DEVIATION OF THE HEAD. (Saint-Cyr.)

Monstrosities.—These conditions are exceedingly varied in practice, particularly in bovines, and their extraction exercises the skill and judgment of the accoucheur to the utmost possible degree—so much so, in fact, that little can be gained by discussing them, as each individual case must be treated according to its respective merits. It may, however, be pointed out that the attendant, before attempting delivery, should make himself fully acquainted with the exact state of the abnormality; and, as they are invariably irregular and angular, too great an emphasis cannot be laid on this fact, for attempts at extraction are liable to cause serious maternal damage if careful judgment is not exercised to the full; this is particularly so in fat animals, whose uterine and vaginal walls are more likely to give way under extra pressure. To obviate this risk, where moderate efforts to bring about delivery have failed, embryotomy should be performed, and the monster removed piecemeal.

Malpresentations.—These are many and varied. In the case of the mare, if the presentation is a comparatively difficult one, after considerable experience, the writer strongly advises casting and chloroforming the patient *forthwith.* By so doing the obstetrician is able to conserve his own energies, and also his patient's; and, further, by a more or less complete obliteration of straining, delivery is often effected with the minimum of manipulative interference. In the case of the cow anæsthesia is not so essential; nevertheless, in some cases it is to be commended. Before attempts at delivery are made, certain details must be attended to. To safeguard his own interests, the accoucheur should make full enquiries from the owner if amateur attempts at delivery have been made, and if on examination uterine damage is noted, this should be pointed out. The operator, having washed his hands and arms with disinfectant fluid and donned a sleeveless operating-gown, should then smear his hands with carbolized oil. The vulva, buttocks, and tail are washed with soap and an antiseptic, and in the case of the mare the tail should be plaited. Two buckets of hot (*boiled*) water should be ready with antiseptic solution, one to hold the instruments and the other to be used to wash the operator's hands and arms at intervals. The operator must now make

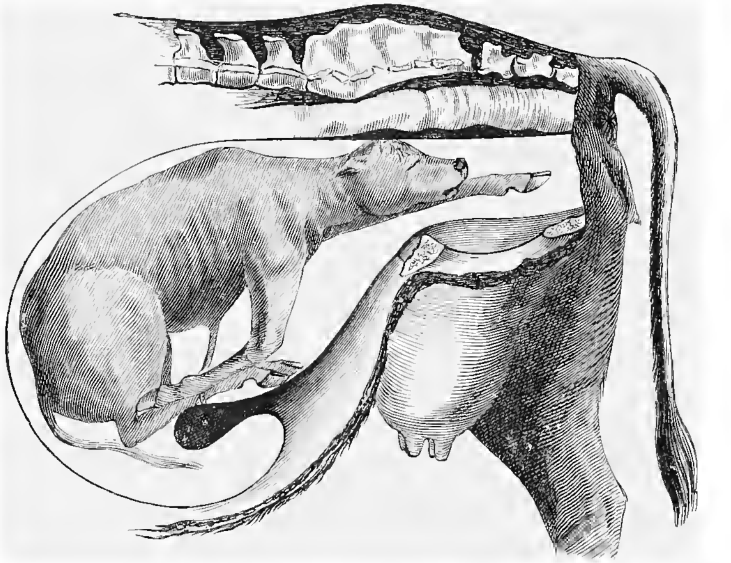

Fig. 53.—Anterior Presentation, Dorso-Sacral Position: One Fore Limb completely retained. (Saint-Cyr.)

himself fully conversant with the exact position of the fœtus; whether he is dealing with one or more of the latter, he should make sure that the limbs presented belong to one fœtus only. Should a limb of a second fœtus be in the vaginal canal, obviously it must be pushed back before the other is brought forward.

Anterior Presentation.—The head of the fœtus in this presentation may be in the vaginal canal, whilst the limbs are retained downwards towards the udder (Fig. 51). If the passage is small, a noose is passed round the head or a slip placed on the lower jaw; it can then be forced forward into the womb, when the limbs are then easily felt. A slip smeared with carbolized vaseline is carried in and passed round the forearm, the eye withdrawn, the end passed through it and the noose tightened. By manipulation it is passed down below the knee until it reaches the fetlock, when it is again tightened and made secure. An assistant pulls on the cord in an upward direction, whilst the operator with his hand in the womb guides the flexed fetlock over the pelvic arch until it straightens itself in the vaginal canal. The other limb is then secured and brought into position in a similar manner. The head is next drawn forward, and delivery is then usually effected with comparative ease.

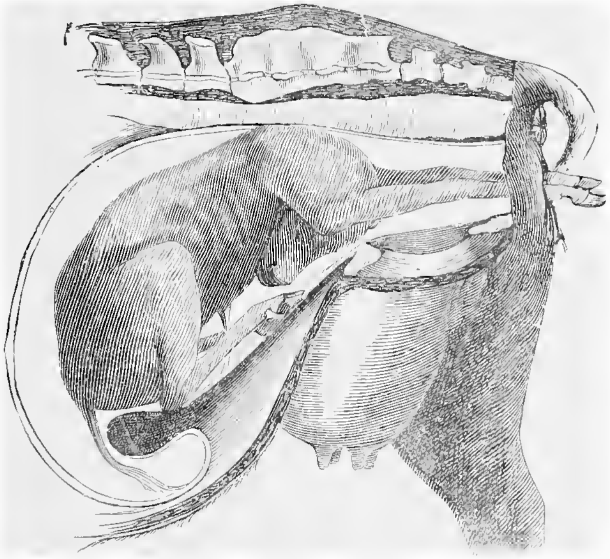

FIG. 54.—ANTERIOR PRESENTATION: EXTREME DOWNWARD DEVIATION OF THE HEAD. (Saint-Cyr.)

The two fore limbs may be presented while the head is bent backwards right lateral or left lateral (Figs. 56 and 57), or the head may be centrally situated between the two legs and the nose directed towards the udder (Figs. 52 and 54). In this presentation the hand comes in contact with

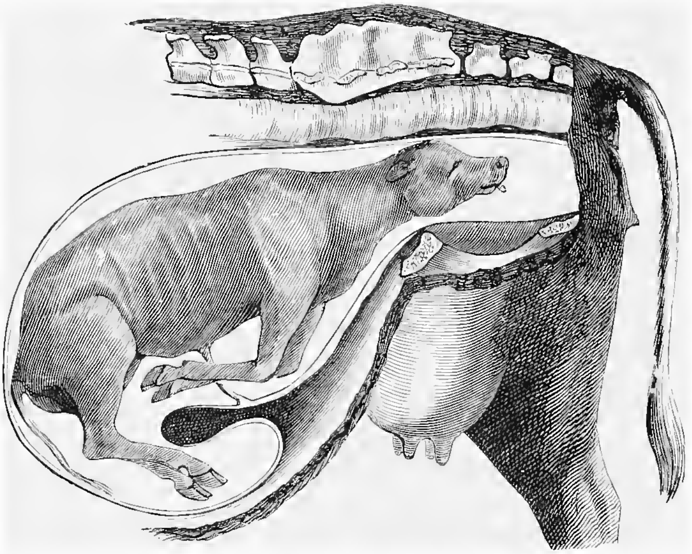

FIG. 55.—ANTERIOR PRESENTATION, DORSO-SACRAL POSITION: BOTH FORE LIMBS COMPLETELY RETAINED. (Saint-Cyr.)

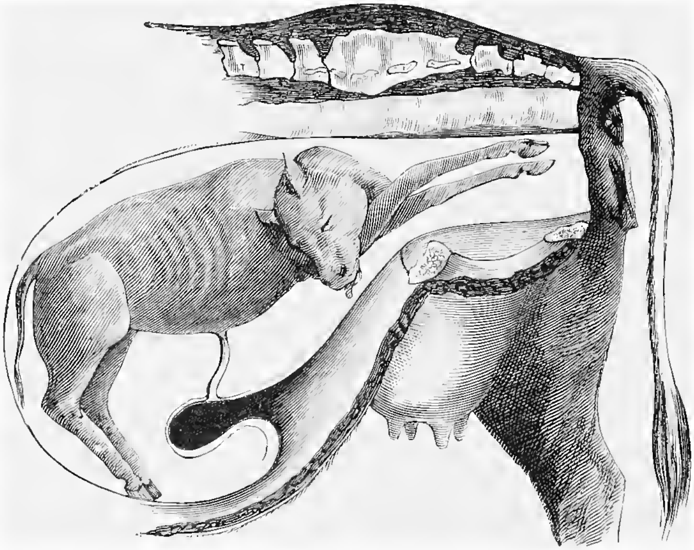

FIG. 56.—ANTERIOR PRESENTATION, DORSO-SACRAL POSITION: LATERAL DEVIATION OF THE HEAD TOWARDS THE SHOULDER. (Saint-Cyr.)

the cranium, or occiput. As a rule, owing to the mother's straining, the skull is wedged tightly against the pelvic arch, and before delivery is attempted it must be pushed forward, after which the hand is able to reach the nose, which is grasped, and efforts made to lift it into the vaginal canal, not always an easy matter, owing to the straining of the patient and the slipperiness of the muzzle. If digital manipulation fails,

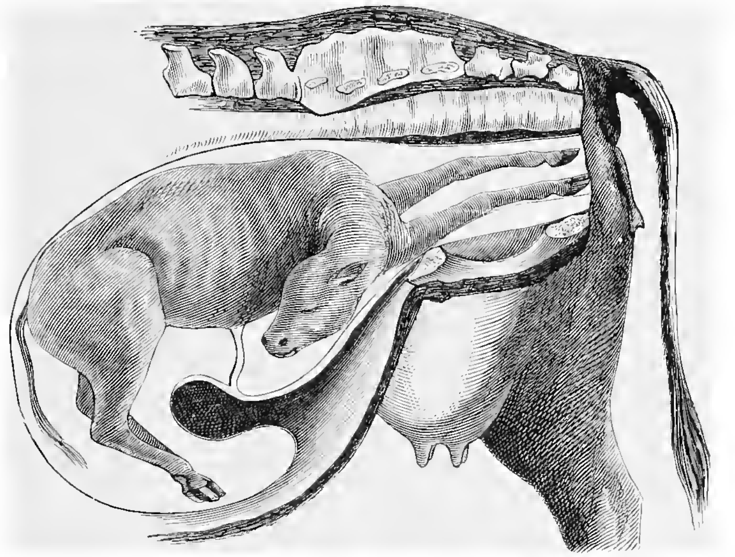

FIG. 57.—ANTERIOR PRESENTATION: LATERAL DEVIATION OF THE HEAD TOWARDS THE ABDOMEN. (Saint-Cyr.)

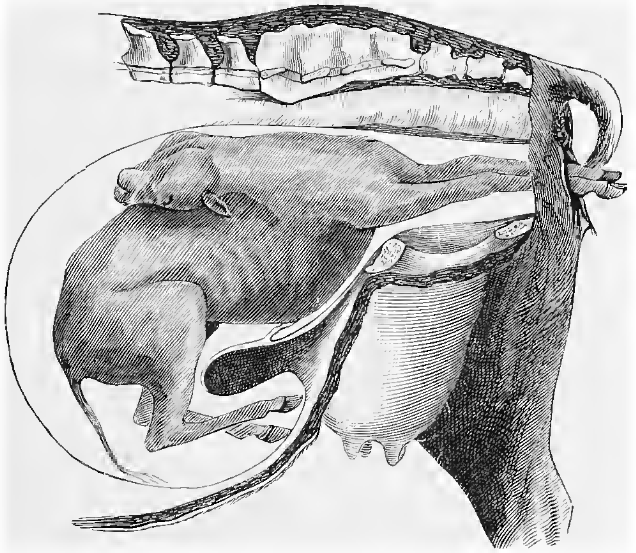

FIG. 58.—ANTERIOR PRESENTATION, DORSO-SACRAL POSITION: DEVIATION OF THE HEAD UPWARDS AND BACKWARDS. (Saint-Cyr.)

a noose may be tightly drawn over the nose and a tall assistant, with his back to the patient, ordered to pull on the cord placed over his shoulder in an upward direction, the operator at the same time having his hand placed over the nose and lower jaw, endeavouring to lift it over the pelvic brim. If this method fails, a slip should be placed round each fore fetlock, the limbs forced into the womb between the acts of straining, when the head or jaw can usually be roped and brought into the vaginal canal. The hand is then inserted and a fore limb grasped while the rope is being pulled by an assistant. In a similar manner the other limb is brought forward, and the fœtus is then ready for delivery. In the case of lateral deviation of the head, if the subject is a calf, it can usually be reached without great effort, but this is more difficult in the case of the foal, owing to the length of neck. In the mare this presentation is often a most difficult one to overcome, requiring much patience and perseverance. The fore limbs must be secured and forced into the uterus before any attempt is made to bring the head forward. In some cases the orbit of the fœtus may be reached, and if so a blunt hook should be inserted and steadily drawn upon, while the operator endeavours to grasp the nose or cheek if these come within his reach; at this stage it is sometimes possible to adjust a slip-rope round the nose or lower jaw, preferably the latter, which is pulled upon by an assistant while the operator covers and guides the muzzle with the hand until it straightens out in the vaginal canal. In some instances it is quite impossible, especially in the case of the mare, to bring the head forward, and if this is so amputation of the limb on the opposite side to the deviation is called for. This completed, a sharp-pointed hook should be inserted into the skin covering the cervical curve, and while this is drawn upon, another hook is fixed further forward, and so on, until a hook reaches the orbit, when the procedure is similar to that already described. If these methods fail to effect delivery and the pelvis is " roomy," traction should be applied to the limbs and delivery effected with the head backward. Considerable force is usually necessary in this case, and should only be carried out when other methods fail. If the animal is down and unable to stand in those cases of lateral deviation of the head, the operator will find considerable advantage in manipulating the fœtus when the head is situated on the opposite side to that on which the patient is lying. In some cases the hind leg or legs become presented with the front legs (Fig. 49), especially in cows and ewes, and this form of presentation, especially to the young obstetrician, is very confusing; further, where amateur interference has been indulged in before expert advice is sought, attempted delivery by pulling one hind and one fore leg or two hind legs often causes irreparable *maternal* damage. No matter what the presentation is, if two legs are presented in the vaginal canal it is the duty of the practitioner to see, firstly, that they belong to one and the same fœtus; secondly, that they are a pair—*i.e.*, two fore or two hind legs. This can be easily ascertained by manipulating the joints at the knee or hock, as the case may be, the roundness of the knee being in great contrast to the angular shape of the hock, combined with the prominence of the os calcis, making an error in diagnosis impossible. When all four legs are presented and the fœtus is *not* firmly wedged, in some cases it is fairly easy to push it back into the uterus. This accomplished, the easiest procedure is to push the head well forward, lay hold of one hind leg, and secure it with a slip-rope, and then take up the other limb and effect a posterior delivery. In some cases, however, this is difficult, in which case the head should be secured by a rope round the neck or lower jaw, or by inserting a blunt hook in the orbit. The two fore limbs are then secured by slip-ropes, after which efforts are made to push one hind leg and then the other well into the womb. The head is now brought forward, then each fore leg, and traction applied. It may be pointed out, however, that if the hind legs are not well forced forward they are liable, when delivery is attempted, to regain their old position, and if traction is then applied, the feet may tear the floor of the womb at the pelvic arch. Great care must therefore be exercised on this important point. In very difficult cases it is advisable to amputate a fore limb at the shoulder, and it may even be considered advisable to remove the head with the chain saw, thereby giving more freedom of action. Again, the head may be presented and the fore limbs directed backward. Here the head is secured by a noose forced gently into the womb and a slip-rope passed round the limb at the knee. The noose, by manipulation, is then directed down the leg to the fetlock-joint, where it is made firm and drawn upon by an assistant in an upward direction while the obstetrician carefully guides it over the pelvic brim in the vaginal canal. The other leg is caught up in the same way and delivery effected (Figs. 51-55).

Posterior Presentation.—This condition is most common in cows, and in many instances the cow is able to deliver herself when the hind legs are coming first. In the mare, however, the pelvic arch of the fœtus often acts as an obstruction, assistance being generally required, especially in primiparæ, to effect delivery.

Breech Presentation.—The presence of the tail between the lips of the vulva is diagnostic. On inserting the hand the obstetrician usually finds the buttocks firmly wedged into the pelvis (Figs. 60-63), and in most cases considerable force is required to get the fœtus into the womb, a necessary procedure before delivery can be effected. When digital manipulation fails, the repeller should be placed across the buttocks, and the fœtus forced back into the womb between the straining efforts of the patient. In the case of the mare anæsthesia is most imperative. A slip eye-rope is now carried into the womb, passed round the limb above the hock, and the eye of the rope drawn out and threaded; then with the tightened rope the hock is drawn outwards; a second slip is now passed round the limb below the hock, the eye drawn out and threaded, and the noose forced down the limb to the fetlock and drawn tight. The operator, with his hand on the os calcis, now forces the hock forwards, whilst an assistant pulls the slip-rope, which is fixed to the fetlock, upwards and outwards. When the fetlock reaches the pelvic brim, the obstetrician bends the fetlock-joint, so that the foot points outwards and upwards; he then

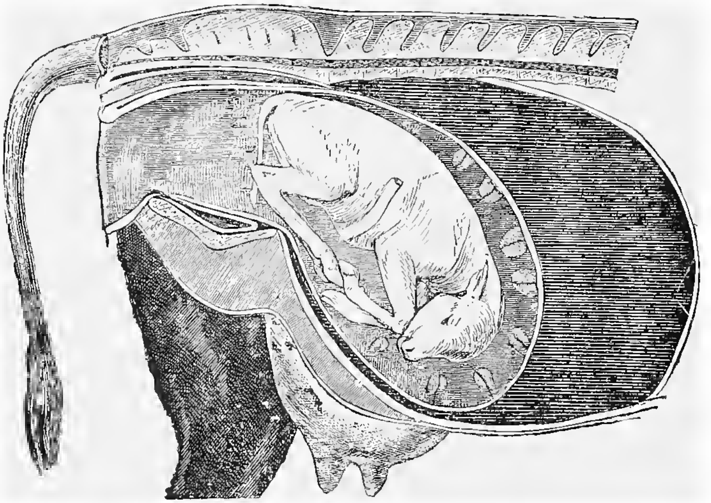

FIG. 59.—HOCK PRESENTATION: CALF. (Franck.)

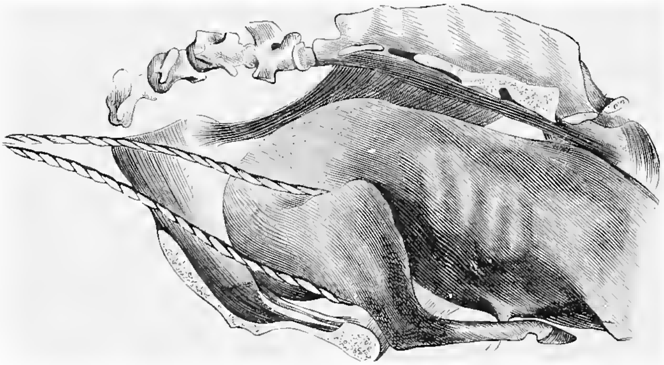

FIG. 60.—THIGH AND CROUP PRESENTATION: THIGH CORDED. (Saint-Cyr.)

guards the foot in the hollow of his hand, lifting it over the pelvic brim, the slip being pulled at the same time until it reaches the vaginal canal. This limb, being still secured with the slip, is pushed forward to free the passage, and the other hind leg is brought up in a similar manner. Both limbs having reached the canal, steady traction will effect delivery.

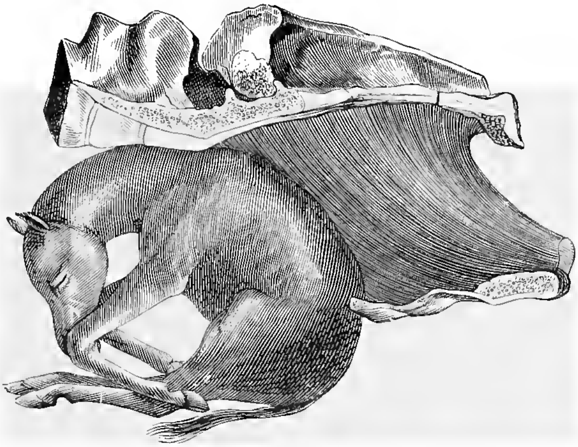

Fig. 61.—Transverse Presentation: Vertical or Cephalo-Sacral Position. (Saint-Cyr.)

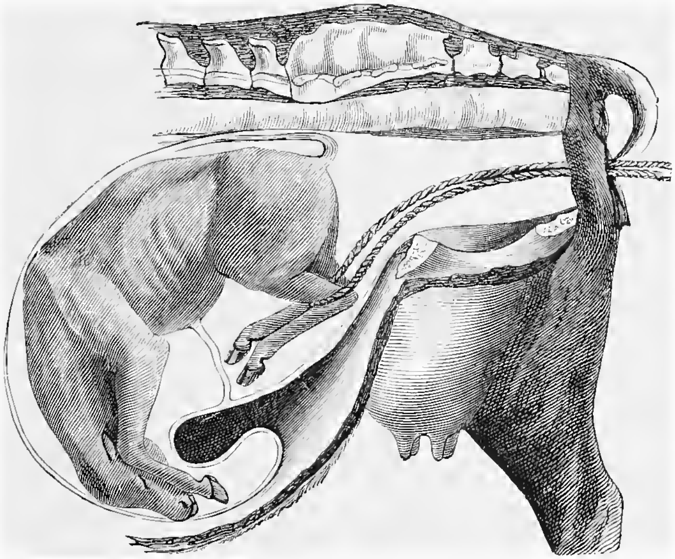

Fig. 62.—Hock Presentation: Hock corded. (Saint-Cyr.)

In those cases where the hocks present themselves in the vaginal canal (Figs. 59 and 62), the fœtus is forced forward into the womb, and slips applied to the limbs in a manner similar to the preceding presentation. Contrary to the views expressed by some authorities, the writer avers, from considerable experience, that the cow or mare should on no account be delivered, in cases of breech presentation, until the limbs are straightened out in the vaginal canal, but perhaps this is not of such great importance in the case of smaller animals.

Posterior presentations are sometimes complicated by the presence of one or both fore limbs, or even the head, in the pelvis. These, of course, must be pushed forward before delivery is attempted, and in some cases rotation of the fœtus is indicated. In aggravated cases amputation of one or more limbs may be called for.

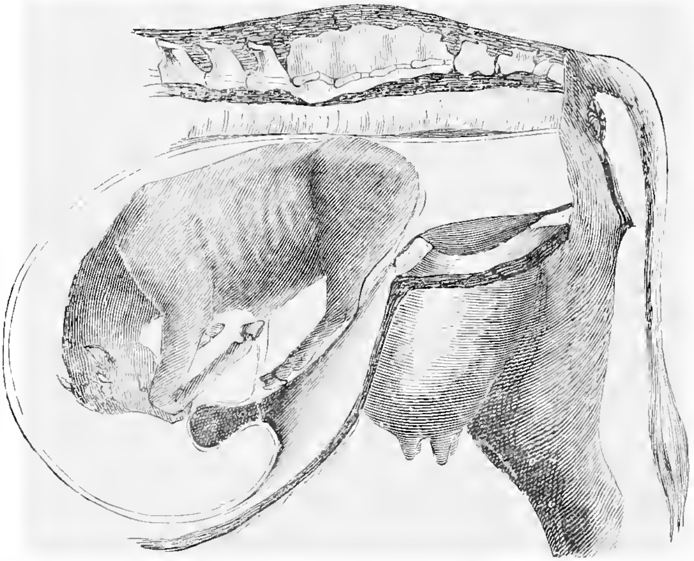

Fig. 63.—Thigh and Croup Presentation. (Saint-Cyr.)

Lumbo-Sacral or Abdominal Presentation (Fig. 61).—Various degrees of this form of presentation are seen in practice, each case requiring special manipulation. The fœtus must be turned to enable the operator to reach the limbs, and, generally speaking, it is easier to convert the presentation into a posterior one and effect delivery by that method.

In the smaller animals, such as the bitch, sheep, sow, and cat, where digital manipulation is invariably impossible, parturition forceps, hooks, and snares are called into requisition. All these instruments must be sterilized before use, and it is of first importance to note when forceps are applied to the fœtus that the vaginal mucosæ are not included between the blades. It is therefore advisable when the instrument has been fixed to the fœtus to slightly rotate it to the left and then to the right, after which the finger should be inserted into the vaginal canal between each blade and the mucosæ.

Embryotomy.—When all reasonable efforts to extract the fœtus *en masse* have failed, dismemberment must be seriously considered. The most successful obstetrician, however, does not leave the operation until such serious maternal damage has been done as to leave little or no hope of recovery.

Amputation of the Fore Limbs.—The limb is pulled out of the vaginal canal as far as possible, and a circular incision made in the skin, preferably above the knee. The leg is now allowed to recede somewhat to admit of the hand, armed with an embryotomy knife, to reach the top of the scapula, and a straight line is made through the skin *from this point* down to the circular incision in the limb. A similar incision is then carried from the inner side of the forearm close to the sternum, also carried down to the circular incision.

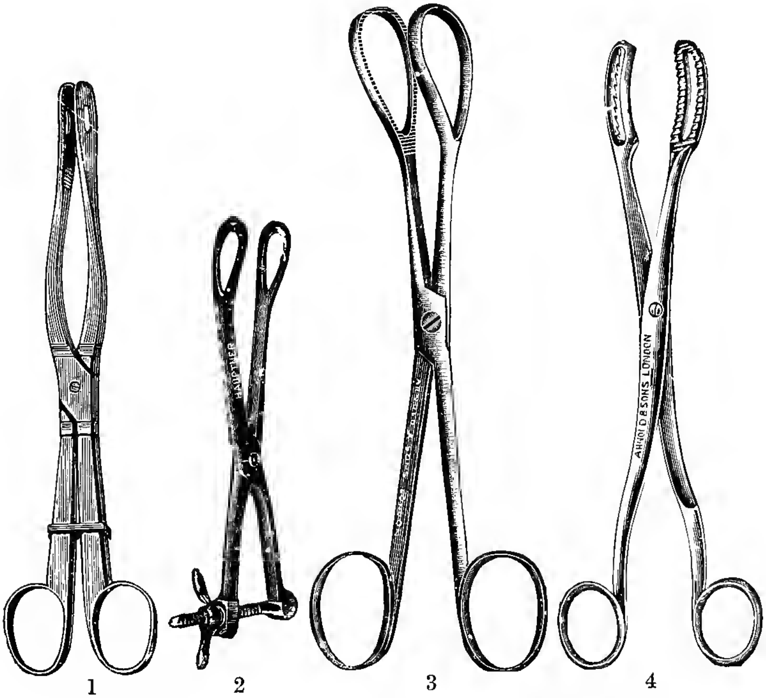

Fig. 64.—Parturition Forceps for the Smaller Animals.
1, Möller's; 2, De Bruin's; 3, Hobday's; 4, Sewell's.

The skin is then separated from the underlying structures by the fingers, and also along the forearm. A slip-rope is next placed above the knee-joint and steady traction applied, the whole limb usually coming away. If difficulty should be found in removal, the muscles joining the limb to the chest may be cut with the knife or torn with the hand. If it is found advisable to remove the other limb, a similar procedure is carried out.

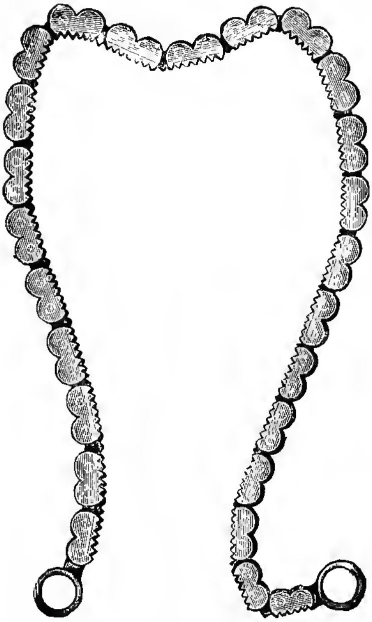

FIG. 65.—PERRSON'S PARTURITION SAW.

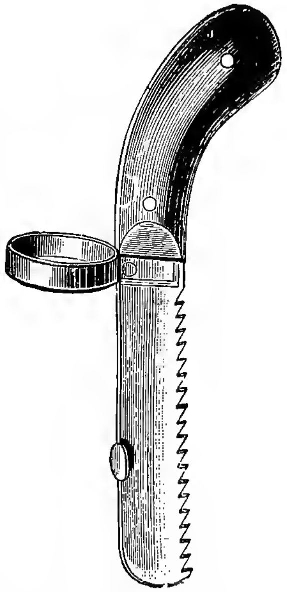

FIG. 66.—ÖHMKE'S OBSTETRIC SAW.

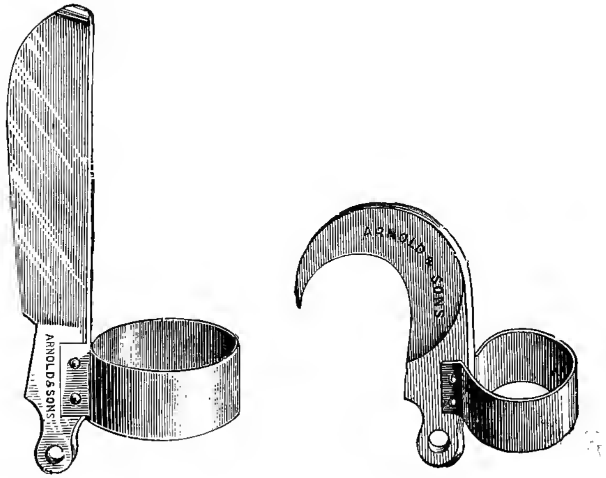

FIG. 67.—FINGER EMBRYOTOMY KNIVES.

Amputation of the Hind Limbs.—This operation is much more difficult than the previous one. Here the limb is usually removed at the hip or the hock. In the case of the former, the skin and muscles covering the pelvis and hip-joint are cut crosswise. The hip-joint having been thus laid bare, and the ligamentous elements cut, a chain saw is then passed over the head of the femur and steadily cut through. Where the hocks present themselves in the pelvic cavity, a rope should be placed round one limb at the hock and drawn outwards as far as possible; the gastrocnemii tendons and ligaments of the true hock-joint are then

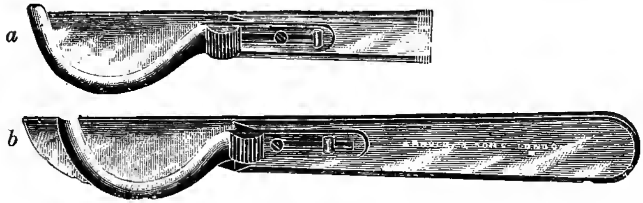

Fig. 68.—Guarded Embryotomy Knives with Sliding Guard. *a*, Closed; *b*, open.

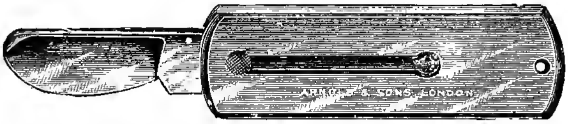

Fig. 69.—Guarded Embryotomy Knife with Spring Sliding Blade.

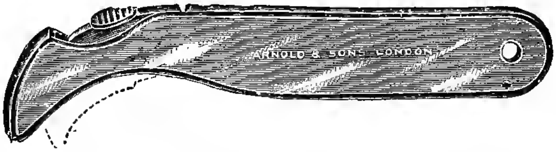

Fig. 70.—Unsworth's Spring Embryotome.

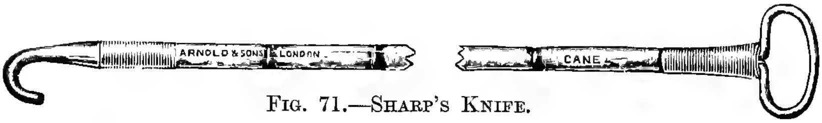

Fig. 71.—Sharp's Knife.

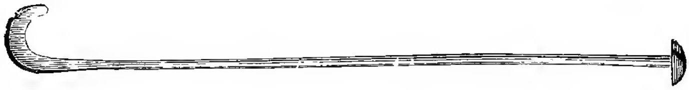

Fig. 72.—Long-Handled Embryotome.

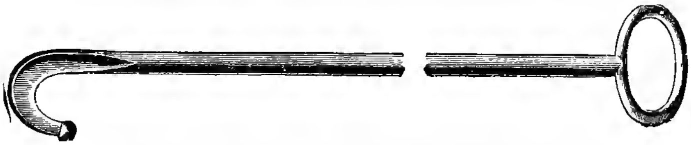

Fig. 73.—Long-Handled Probe-Pointed Embryotome.

severed with the knife, or the chain saw may be used. A similar procedure is carried out on the other hock, traction applied steadily, and delivery effected.

Antiseptics in Parturition.—Unlike the human accoucheur, the veterinary obstetrician cannot carry out complete asepsis in his work, nor in many cases can he emulate perfect cleanliness, through his hands continually coming in contact with unclean objects. Nevertheless, the careful operator can and does carry into his work principles which go a long way towards preventing the development of post-partum sepsis in his patient. As it has already been suggested, the operator's hands should be washed in an antiseptic and smeared with carbolized oil or carbolized vaseline. The buttocks, vulva, and tail of the patient should, as a routine practice, be washed with carbolic soap and antiseptic solution. The instruments are placed in a bucket containing antiseptic. All slip-ropes before use should be well smeared with carbolized vaseline or other antiseptic. The hands and arms of the obstetrician should be washed at intervals several times during the operation, and each instrument after use must be returned to the antiseptic solution. Antiseptic surgery is of the first importance in the mare, where too rigorous a method cannot be carried out; with a bovine greater freedom may be taken; nevertheless, it is bad surgery to impose too much upon Nature, especially if the dystocia is complicated and tedious.

The ewe and the bitch are also specially prone to septic infections. When delivery is complete, the writer has for many years anointed the vaginal and uterine mucosæ with neat whisky, carried in by the hand, with excellent results. Failing this, equal parts of carbolic and camphor oil make an excellent antiseptic dressing, to which a very little boric acid may be added with advantage. The insertion of an antiseptic pessary daily is also beneficial. If there is laceration of the mucosæ, the wounds should be dressed daily for at least a week. Uterine douches, in the writer's experience, should not be undertaken lightly. When the uterus is much strained and bruised, and where the patient is exhausted, contraction is slow, and if fluids are injected they are expelled with difficulty, their presence acting as a foreign body, impeding Nature's power of contractibility. In many cases of dystocia followed by local and systemic inertia, the placenta is often retained, and rapidly putrefies; consequently, if it fails to come away in a reasonable time, it should be removed by digital manipulation, the greatest care being taken to see that none of it remains. The after-treatment of all cases of difficult parturition consists of doing everything conducive to the patient's comfort, allowing good food, giving tonics, stimulants and nutrients, and having resort to uterine antiseptics to prevent sepsis.

DYSURIA.

Where difficulty in micturition exists, the cause must be ascertained and removed. The presence of calculi, strictures, or paraphymosis as a direct cause, and as a remote cause such a condition as spinal injury or tetanus, where the animal is unable to place itself in a position to micturate, must all be looked for in rotation.

The catheter and digital exploration offer the best means for locating the cause, the treatment for which will be found under the various headings.

EAST COAST FEVER.

A South African bovine disease which has led, during the last two decades, to enormous cattle losses in that subcontinent.

Spread by the agency of ticks, and having its incidence mainly upon the red blood-cell, it is in such respects similar to that other very destructive cattle malady known as Texas fever or redwater. This fact led to considerable confusion on the part of early investigators, who pronounced the two diseases identical. Amongst many differences, however, recognized later, perhaps the two most divergent points are the fact that the intermediary bearer differs (the blue tick, transmitting the *P. bigeminum* of redwater, being incapable of transmitting the *P. Theileri* of E.C.F.), and the fact that in the former the red-cell invasion is attended by great corpuscular waste, while no actual destruction follows the invasion of the blood-stream by the E.C.F. organization. Spread by several species of ticks (chief amongst which being the *Ripicephalus appendiculatus*, or brown tick), the disease for years swept through the northern parts of South Africa, hardly checked by the repressive policies adopted by the Government.

Professor Koch of Berlin—engaged at great cost to investigate the disease—declared finally that nothing could arrest its progress, and that it would sweep the subcontinent and become arrested only by the sea. Vaccines were devised by Theiler from the spleen and lymphatic glands, but were found ineffective, or not adapted for general application, and reliance for some years was placed in measures of isolation and fencing.

" When it was realized that fencing was not effective, the Government resorted to the expedient of killing off herds, large and small, so that what the disease did not carry off the executioner's bullet exterminated to such an extent that the northern districts of the Transvaal became almost denuded of cattle " (Commission of Enquiry into E.C.F. of South African Senate, 1920).

Guided by a study of the life-history of the tick responsible for the disease, Pitchford—then bacteriologist to the Natal Government—

attempted the solution of the problem from the point of view of tick repression by means of dipping in a solution the composition of which could be adjusted so as to ensure a lethal effect upon the tick at all three stages of its development without injuring the cattle by the frequent immersion necessary to achieve the result (see Ticks, Control of).

This system of repression of E.C.F., after many vicissitudes, is now recognized as the established method of controlling the disease, the Government Commission, *ut sup.*, speaking of the overwhelming evidence of the efficiency of the system devised by Colonel Pitchford as "the only antidote to effect the eventual eradication of the disease."

Dipping at the short interval of three days, therefore, may be looked upon as the only safe preventive measure in dealing with this devastating tick-borne disease, and such system can prove effective only where the details as laid down by the investigator are carried out efficiently and without modification. Where such conditions are observed, the disease can be both prevented and eradicated.

Individual treatment is, of course, out of the question, and the mortality is about 95 per cent. of all bovines affected, few of the existing stock diseases of the world being more insidious in attack or more fatal in the issue.—*H. W. Pitchford.*

ECLAMPSIA.

The writer doubts very much whether *true* eclampsia ever occurs in the lower animals. There is, however, a very close approach to it in those so-called cases of ante-partum milk fever in cows, which are really not milk fever at all. Here we have a typical coma alternated with spasms, and a *constantly* high blood-pressure. This latter the writer has proved on several occasions with the sphygmomanometer. The first object in view is to lower this blood-pressure, and no agent is better than blood-letting, followed by a hypodermic injection of morphia in large doses, the inhalation of chloroform, and, if necessary, the transfusion of normal saline solution. Where the animal is pregnant, artificial labour should be induced by dilating the os and piercing the envelopes. Whilst the patient is in the fits, it is needless to add, no medicine should be administered *per oram*, but as soon as consciousness returns a bold purgative is indicated, followed by small doses of tincture of aconite and sodium bromide. A form of eclampsia is also seen in the bitch, especially when rearing too large a family, in which case reduction of the latter is called for. The patient should be placed in comfortable surroundings, kept quiet, 1 to 3 grains of calomel placed on the tongue, and a hypodermic injection of morphia given. If the case is a severe one, an enema of $\frac{1}{2}$ to 1 dram of chloral hydrate dissolved in milk should be injected and the patient kept without food for twenty-four to thirty-six hours, after which the diet should be liquid for the next two to three days.

ECTROPION.

Eversion of the eyelid is not a very common condition in veterinary practice. The visible conjunctiva may be painted two or three times a week with a solution of nitrate of silver, 10 grains to the ounce, and if the case is a slight one this usually brings about restoration to the normal. Where the eversion is great, however, nothing but surgical means will avail. The bulging portion of the conjunctiva is painted with cocaine, and an elliptical portion, of which the long axis is horizontal, is removed. Care must be taken, however, that too much is not removed, or the opposite condition—viz., *entropion*—will ensue during cicatrization. It is therefore good practice to remove too little rather than too much, as in the case of the former a second operation can be performed, or pencilling with lunar caustic may be carried out. Naturally, the eye, prior to operation, should be treated with an antiseptic and all instruments used sterilized.

ECZEMA.

For therapeutical purposes eczema may be divided into acute and chronic, and although the two conditions are different phases of one and the same disease, the treatment of one is so opposed to that of the other that they might be separate diseases altogether. In the acute stage the skin is always hypersensitive, and this important point must be considered when the practitioner is deciding upon his therapeutical line. The skin, having been cleansed of debris with soap and water, is dried, a little bland salad oil is lightly rubbed in, and the superfluity removed with a cloth, the object of the oil being to soften the dermis; the skin is then painted daily with a 1 per cent. solution of picric acid night and morning. If this treatment fails to bring about resolution in four or five days, the following should be applied:

℞ Calaminæ Preparatæ Zinci Oxidi	āā ʒii.
Liquoris Calcis	℥ii.
Olei Olivæ	℥vi.

M. Ft. lini. Apply night and morning.

Or—

℞ Acidi Salicylici	ʒii.
Zinci Oxidi	ʒiii.
Olei Olivæ	℥viii.

M. Ft. lini. Apply night and morning.

Where the skin appears too sensitive for dressings and there is much weeping, the following powder is advised:

℞ Plumbi Carbonatis	āā ʒi.
Zinci Oxidi	
Bismuthi Oxidi	
Amyli	q.s. ad ℥iv.

M. Ft. pulv. Apply night and morning.

If the disease tends to become subacute, the following is advised:

℞ Liquoris Carbonis Detergentis	āā ℥ss.
Liquoris Plumbi Subacetatis	
Tincturæ Opii	
Olei Olivæ	℥ii.-iii.

M. Ft. lini. A little to be applied with a brush daily.

After three applications, the whole affected area should be washed with hot water and soap, dried, and common coal-tar lotion 1 in 6 applied carefully with a brush. This treatment has given the writer excellent results

For dogs, Wallis Hoare recommends:*

℞ Zinci Oxidi	℥iii.ss.
Adepis Lanæ Hyd.	℥ss.
Liquoris Calcis	℥iv.
Olei Olivæ	℥iv.

M. Ft. lini. Apply twice daily.

In the chronic form bacteria are usually much in evidence, and antiparasitic treatment is indicated. The first principle is to remove the scales and debris from the skin by washing with hot water, soap, and soda; and, secondly, to set up acute dermatitis by scrubbing the parts well with caustic soda or caustic potash, drying thoroughly, and applying the following:

℞ Acidi Borici	āā ʒiv.
Zinci Oxidi	
Cretæ Preparatæ	
Olei Olivæ	q.s. ad ℥i.

M. Ft. lini. Apply twice daily.

Or—

℞ Resorcini	ʒi.
Sulphuris Præcipitati	℥i.
Olei Olivæ	℥viii.

M. Ft. lini. Apply twice daily.

Or—

℞ Hydrargyri Subchloridi Unguenti	1 in 6

M. Ft. ung.

Where a vicious circle of bacterial propagation has set in, defying the foregoing lines of treatment, it is most probable that the *Bacillus acne*, staphylococci, and streptococci are present, and auto-vaccination is indicated.

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* "Veterinary Therapeutics."

General Treatment.—If the patient is dyspeptic, usually acid dyspepsia, the bowels should be unloaded with a saline. For the dog, 1 dram of Glauber salts and 1 dram carbonate of magnesia if a medium-sized animal. For the horse, 4 drams of aloes, 4 ounces of Glauber salts, and 1 dram sodium carbonate. For the ox, 12 to 14 ounces of Glauber salts and 1 pound treacle. The patient should then be placed on a course of potassium nitrate and sodium bicarbonate. When the patient is anæmic, a course of arsenic and iron is indicated, arsenic being especially useful in all chronic cases of eczema. The writer some years ago obtained excellent results in a chronic and obstinate case by washing the patient, a retriever dog, twice daily in sea-water, and injecting bi-weekly under the skin 2 ounces of sea-water and 4 ounces sterile water.

Diet.—Diet in an eczematous subject is of first importance, especially in the case of the dog. Some authorities advise a no meat dietary, others include meat, but this much is certain—salt meats, tinned meats, and salt fish, are as poison. Vegetables grown on the surface are to be preferred to those growing underground.

In all cases eczema is a debilitating disease, therefore the patient must be sustained with highly nutritious food, and in the dog a course of cod-liver oil and malt extract or salad oil often works wonders.

EFFUSION.

In this condition the serum of the blood collects in the tissues and cavities of the body, and if in any quantity its removal is called for. Some animals are more predisposed to effusion than others, and this in many cases is largely due to a deficiency of the calcium content of the blood, in which case lactate or other salts of calcium are indicated. If the effusion is of a passive character, a mild aperient should be given and full doses of potassium iodide or biniodide of mercury ordered. The excess of fluid may be drained away by tapping, and if situated locally, scarification or massage and the application of stimulating liniment or blister are advised. Moderate exercise, with good food, is also called for.

ELEPHANTIASIS.

Where the disease is of long standing and the subcutaneous tissue has become indurated and firmly organized, treatment is of little avail. Standing in the stable aggravates the condition; hence such a case does better running at grass, but if kept indoors, plenty of exercise must be given. In the more recent cases, where, in addition to the fibrous deposit, there is also evidence of serous effusion, a dose of aloes should be prescribed and a course of full doses of potassium iodide ordered. Advantage also sometimes follows the application of a smart blister, and, paradoxical as it may seem, the writer has obtained favourable results from the application of Bier's treatment.

In cases of long standing where ulceration takes place, and pyogenic bacteria are present, a course of auto-vaccination has given good results, and is to be recommended where the more simple line of treatment fails.

EMACIATION.

In all such cases there is a disturbance of the metabolism; this may be due to functional or organic derangement. It is evident if the former is the cause that treatment may offer good prospects, but if the latter, prognosis must be guarded. In nearly all functional emaciations the liver will be found to be the most important organ involved, and here it is due to deficient biliary activity. A good example is to be found in *distomatosis* in cattle and sheep.

In the early stages, in an animal thus affected, the general condition is greatly improved, for by reason of the stimulating action of the flukes upon the liver the glycogenic function is activated. When the next stage is reached—organic disintegration—emaciation follows. The treatment of emaciation can only be outlined on general lines, for each case should be prescribed for on its merits. The food must be of the richest fat-forming kind, and sugars take prior place—in the horse, ox, and sheep, oil-cake, oats, maize, roots, treacle; in the dog and cat, fats, patent foods, rice, milk, Glaxo, sugar, cod-liver oil, malt extracts, etc.

Medicinally, alteratives, stomachics, and tonics are indicated—*i.e.*, sulphate of sodium, potassium, magnesium, iron and phosphorus, aloes (small doses), gentian, nux vomica, calumba, cinchona, quassia, nitro-hydrochloric acid, ginger, etc.

EMBOLISM.

Treatment is, as a rule, of little avail. Where, however, the embolus is located in a non-vital part of the brain and is diagnosed as such, the patient should be kept perfectly quiet, ice bags applied to the poll, and a full dose of calomel administered. The patient is then placed on a course of large doses of potassium bromide with potassium iodide. Embolism may also occur in other organs of the body besides the brain, but it is doubtful if the condition is ever detected during life.

EMBRYOTOMY. *See* Dystocia.

EMPHYSEMA (PULMONARY)—BROKEN WIND.

Largely attributable to dietetic errors at the outset, these must be investigated and corrected. The condition is most common in the horse, particularly in horses prone to gross feeding; hence a regulated dietary is of first importance. Fusty hay, kiln-dried oats, and the rank dried grass eaten by hunters left out too late in the autumn, if followed by a dry summer, are exciting causes of emphysema. The diet ordered should be light and *concentrated*, no long hay being allowed; and if the animal eats his bedding, he should either be muzzled or bedded on litter or sawdust. Crushed oats, bran, the best hay chaff, and boiled linseed or small doses of linseed oil, make an ideal combination. The quantity must be small and given at frequent intervals. The patient should not be worked on a full stomach, and he should have drinking water *before* meals only. The writer has found good results follow the addition of dried ground horse-chestnuts in the manger food. In animals in high condition, where in all probability fatty infiltration is in existence, a low diet and constant exercise must be ordered. If the lung parenchyma is not extensively damaged a favourable prognosis may be given. If, however, the case is chronic and of long standing, amelioration of the graver symptoms is as much as the practitioner can undertake. In prescribing for emphysema, endeavours should be made to improve digestion and stimulate the respiratory centres and the vagus. It is good practice always to give a dose of physic to begin with, for better digestion will follow this procedure, and effete material is removed from the stomach and bowels. A month's treatment of the following is then prescribed:

℞ Arsenicum albi	grs. v.
Pulveris Nucis Vomicæ Foliorum Stramonii	āā ʒii.
Sodii Bicarbonatis	℥i.

M. Ft. pulv. One powder to be given night and morning in manger food.

Where there is cardiac irregularity, occasional doses also of digitalis and sparteine may be given. If no improvement follows this line of treatment, a course of the potent alkaloids may be tried—*i.e.*, strychnine sulphate gr. i., veratrine gr. i., liquor atropine sulphate ♏xxx., injected subcutis daily.

In some cases where there is a tendency to bronchial spasm and congestion combined, the writer has found benefit derived from tincture of aconite ʒi., camphor ʒii., given in ½ pint of linseed oil daily for three days, and then every other day for a week. Both in horses and cattle 2 or 3 ounces daily of dried ground horse-chestnuts in manger food gives good results.

EMPHYSEMA (SUBCUTANEOUS).

Cases of this kind seen in practice are most commonly due to rupture of the trachea or large bronchi, or wounds situated in certain regions of the body, whereby the movement in locomotion facilitates a pumping action and admits an ingress of air, such as in the elbow region. It is also seen in malpractice in performing *paracentesis abdominis*, but here gas and not air finding its way under the skin is the cause. If the accumulation of air or gas, as the case may be, is slight, no treatment is called for, a gradual absorption taking place, but if extensive the skin should be punctured in several places to permit of the egress of the air or gas. Preventive measures are also called for. If the cause is a wound, this must be plugged tightly and the patient kept quiet.

If it is respiratory in origin, coughing aggravates the condition, and must be alleviated as far as possible by the administration of such agents as morphia, camphor, chloral hydrate, or belladonna.

EMPYEMA.

When the clinician, by the insertion into the chest of a trocar and canula, demonstrates the presence of pus, its immediate evacuation is called for, and the success or failure of the case is largely dependent on the early or late liberation of the infective material.

Operation.—The skin is clipped over an intercostal space, usually between the fifth and seventh ribs at their lowest point, and an incision made through the entire chest wall 2 to 4 inches long. Where the patient's ribs are but slightly covered with muscular tissue and fat, specially deep, blunt-pointed retractor hooks can be made to grasp the two ribs and drawn in opposite directions, thereby widening the lips of the operation wound, giving free vent to the accumulated pus, and in addition permitting a good view of the cavity. After the flow of pus has become reduced, the chest is irrigated with warm normal saline solution, to which has been added a small quantity of boracic acid, hyperchlorites, or proflavine. The method the writer adopts is as follows: An incision is made through the skin and muscles of the sixth or seventh intercostal space near the backbone, through which is passed the nozzle of a syringe (a human enema syringe answers well) and the solution injected, egress being obtained at the lower opening. The wound is then plugged with gauze. The irrigation should be carried out daily. To keep the wound patent a short metal tube with a flange should be inserted and kept in position by a tape passing round the chest. This tube should be removed daily and cleansed. The patient must be kept in healthy surroundings, a liberal diet allowed, and a course of tonics, such as iron, quinine, gentian, and calumba, prescribed. If the patient makes satisfactory progress, the pus will gradually cease, and the lung capacity will increase, when the drainage tube may be removed. In all cases a careful examination of the pus should be made, the bacteria present noted, and an autogenous vaccine prepared.

The writer places great reliance in vaccine therapy in those cases where the operation has been performed early.

ENCEPHALITIS.

It is doubtful if a true case of inflammation of the brain ever recovers, and prognosis must always be unfavourable. Treatment consists of a full dose of aloes and calomel, venesection if blood-pressure is high, and the administration of the following cerebral sedatives:

℞ Sodii Bromidi Potassii Bromidi Chlorali Hydrati	āā ℥ss.
Extracti Cannabis Indicæ	ʒii.

M. Ft. pulv. To be given three times a day.

For the dog :

℞ Potassii Bromidi Chlorali Hydrati	āā grs. xx.
Extracti Cannabis Indicæ Hyoscyaminæ	āā gr. ½
Aquæ	ad ʒii.

M. Ft. haust. Two teaspoonfuls to be given three times a day.

Ice bags should be applied to the poll, and the head kept as high as possible. If the case progresses, blistering is advised later. Needless to add, care should be taken in administering medicines, and the patient kept quiet and prevented from injuring himself.

ENDOCARDITIS.

This disease is invariably a sequel to acute bacterial infections, such as influenza, strangles, rheumatic fever (so called), distemper in the dog, etc. In cattle, as is well known, it is also traumatic. Drug therapy is handicapped by its pronounced limitations. Probably the most useful combination is salicylate of soda and potassium iodide. Later sparteine and digitalis may be tried. The patient should be kept as quiet as possible, and the strength maintained with nutrients such as gruels, eggs, milk, etc.

ENDOMETRITIS.

This disease is of particular economic importance to practitioners practising in breeding districts. In the vast majority of cases bacterial aggression is our *bête noir*, resolution or dissolution depending largely upon the progress the disease has made before expert advice is called in. Unfortunately, the condition in many instances has passed from the endometritic to the metritic, or even the metroperitonitic, phase. We cannot, therefore, impress upon our clients too strongly the great necessity of early consultation in such cases. The first object is to tackle the disease at the source of infection—*i.e.*, the womb—whilst the second is to neutralize and eliminate the inevitable toxæmia due to the absorption of toxins from that organ; the third is achieved in maintaining the patient's strength. All superfluous fluid should be siphoned from the uterus with a large-calibre flexible tube, and any remaining fluid may be absorbed by inserting a sterile towel or tampon. The following is then injected at a temperature of 110° to 112° F.:

℞ Proflavini	grs. ii.
Acidi Borici	ʒss.
Acidi Citrici Sodii Chloridi	āā ʒi.
Aquæ (Boiled)	O.i.

M. Ft. lotio. Inject daily.

This solution should *not* be removed, but the following day the accumulated material should be siphoned off as before and the injection repeated. In the small animals a proportionate quantum should be injected; or 1½ pints in large animals and 2 to 4 ounces in small animals of hyperchlorite solution may be injected into the uterus. The writer does not advise, in cases of acute inflammatory metritis, douching with large quantities of fluid, as is sometimes carried out in practice. This tends to act as a foreign body, irritating and depressing an already much inflamed and flaccid organ. These injections should be carried out daily for three or four days, when antiseptic pessaries, such as boric acid, iodoform, or carbolic acid, may take their place. The proprietary preparation known as Bissiline forms an excellent pessary. The writer has had a pessary prepared which has given excellent results in these cases:

℞ Proflavini	gr. i.
Bismuthi Carbonatis Acidi Borici	āā grs. v.
Acidi Citrici	grs. xv.
Excipient	q.s.

M. Ft. pessary. Insert one daily into the womb.

If there is much straining, a morphine pessary is indicated. It is scarcely necessary to point out that the practitioner should at the outset examine the womb carefully for retained pieces of putrid placenta, or an adherent tumefied cotyledon, these acting as excellent foci for bacterial development. If the os uteri is so contracted as to defy the entrance of the hand, the application of extract of belladonna dissolved in carbolized oil, combined with the rotation of the fingers arranged in the shape of a cone, usually brings about sufficient relaxation to effect an entrance. As regards the toxæmic condition, the attendant must see that the eliminatory channels are kept well flushed; thus the bowels are opened by an aperient, preferably a saline, the kidneys stimulated by oil of turpentine, liquor ammonia acetate, potassium chlorate, or potassium nitrate. The skin and kidneys should be activated with sodium salicylate and subcutaneous injections of normal saline solution. The toxins may also be neutralized by the injection of antitoxic sera combined with a stock vaccine of streptococci, staphylococci, and *B. coli.* If the patient is a valuable animal, an autogenous vaccine should be prepared and the *materiès* collected as follows: The lips of the vulva are washed with an antiseptic solution, dried, and painted with iodized petrol. The right hand is then cleansed in the same solution, and a sterile tube 1½ inches long, the mouth of which is covered with the thumb, is carried into the womb as far as possible. The thumb is then removed, and the mouth of the tube drawn along the mucosæ, the thumb replaced, and the tube withdrawn and plugged. As the animal's appetite is usually bad or indifferent, sustaining by nutrient artificial foods, eggs, milk, gruels, and, in the bitch, meat extract, Glaxo, port, is advised. Finally, the general comfort of the patient must be attended to. When convalescence sets in, the animal should be placed on a course of vegetable and mineral tonics.

ENTERITIS.

Inflammation of the intestines may present itself in a limited area of the bowels, as in volvulus or intussusception, where the condition is purely mechanical, or it may affect the major portion of the intestinal canal, and even the stomach, constituting gastro-enteritis. If the condition is very acute, any line of treatment is invariably unsuccessful. Excluding the mechanical elements of enteritis, dietetic irregularities and errors must be looked upon as the most prolific exciting causes. Except in cases caused by irritant poisons and the lesions symptomatic of certain specific diseases, these dietetic irregularities are cumulative in their action and effect.

Unwholesome food passing along the intestinal canal sets up a form of irritative dyspepsia at the outset, which if persisted in leads to acute catarrh and general depression. By this time the patient is a fit prey to bacterial invasion, which in turn is followed by bacterial infection and acute enteritis. A perfectly normal mucosa is in itself resistant to bacterial infection, not so a mucosa in a state of catarrh. Further, the auto-intoxication which is going on during the enteritic and pre-enteritic stages acts as a general depressant, and perhaps no organ is more depressed than the liver, by reason of the fact that the major portion of the absorbed toxins pass through it; consequently that important organ is thrown out of gear, and its highly antiseptic secretion—bile—is diminished in quantity and quality, with the result that the intestinal canal is rendered less aseptic thereby. Moreover, the intestinal mucosæ being in a constant state of congestion and catarrh, an excessive secretion of mucus is constantly going on. At an early stage of proliferation the epithelial cells lose their phagocytic action, and they, with the mucosal elements, act as admirable bacterial protectors and incubative areas, to the detriment of the patient. To sum up, the predisposing causes are largely *dietetic*, the actual cause *bacterial.* With regard to treatment, it may at once be confessed, we know of no specific or even a palliative for acute enteritis. The ideal treatment, if it were at all possible, would be lavage of the bowels in subacute cases. At the beginning the patient should have an oily aperient—linseed oil or medicinal paraffin. In cattle a saline is preferred, well diluted. For the horse and ox the following may be chosen for its antiseptic and anodyne properties:

℞ Camphoræ	ʒii.
Chlorali Hydrati	℥i.
Liquoris Calcis Olei Lini	āā ℥i.ss.

M. Ft. haust. To be given in a pint of flax gruel every two hours.

When the pain is great, hypodermic injections of atropine with morphia are advised, and if the heart's action is tumultuous, full doses of aconite, and bleeding may be resorted to with advantage. The writer has also found considerable benefit derived from the subcutaneous injection of double-strength normal saline solution, in quantities of 1 to 1½ gallons. Warm enemas may be given at intervals, and hot rugs applied to the abdomen for three or four hours at a stretch. Should convalescence take place, the patient's diet must be carefully selected. Steamed hay, hay tea, crushed oats, bran, in small quantities and at frequent intervals, may be given. Roots must only be allowed sparingly, and care should be taken to note that they are ripe and sound. Grass, if at all rich and succulent, must not be given until the patient is well on the road to recovery. Bland mucilaginous drinks, such as linseed tea, may be allowed *ad lib.* When chemical poisons are the primary cause of the disease, suitable antidotes must be given at once. In the dog, enteritis seems to run a less acute course than in the horse. Treatment should begin by giving a dose of salad oil or medicinal paraffin, after which the following is advised:

℞	β-Naphthol	grs. iii.
	Acidi Borici	grs. v.
	Bismuthi Subnitratis	grs. x.

M. Ft. pulv. One powder every five hours in mucilage of tragacanth.

If there is much pain, small doses, repeated often, of tincture of aconite or chloral hydrate should be given. Hot rugs applied to the abdomen and warm enemas tend to relieve tension. Later, doses of bismuth and soda bicarbonate are very useful; a vegetable tonic and stomachic may be added, such as infusion of gentian or calumba.

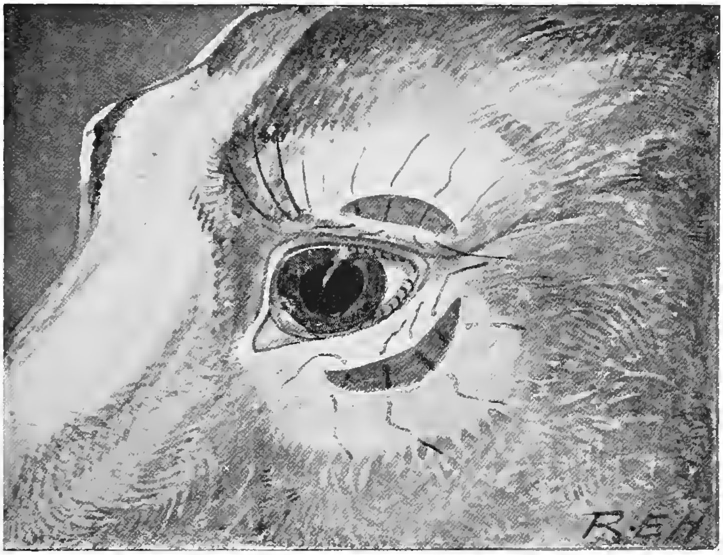

Fig. 74.—Sketch showing an Elliptical Piece removed from Each Eyelid for Entropium.
(Hobday's "Surgical Diseases of the Dog and Cat.")

Regarding diet, nothing but liquids should be given for some days—milk puddings, peptonized milk, and beef tea. Later on, tripe, scraped beef, soups, and wholemeal bread, may be recommended.

ENTROPIUM.

Inversion of the eyelids is occasionally seen in animals, most commonly in the horse and dog, and usually in the lower eyelid. If the condition is slight and there is no corneal or conjunctival catarrh, it should be left alone; but if it is pronounced and unsightly, surgical interference is called for. Cocaine or novocaine is injected under the lid, the hair shaved, and a piece of skin is picked up with the forceps near the eyelash, equidistant between the outer and inner canthus, and with a pair of sterile scissors an elliptical piece is removed. In a similar manner a fold of the orbicularis palpebrarum muscle is also removed. The resulting wound is now sutured, and covered with collodium. If aseptic precautions are taken throughout, the wound will heal by first intention. It is scarcely necessary to point out that the surgeon must be the best judge of how much skin to remove, for clearly if too much is taken eversion will follow, and if too little inversion will remain. It is, however, good practice to remove too little rather than too much, for by bringing the edges together *pro tem.* it is easy to ascertain if enough has been removed, and if not a little more can be sacrificed.

EPIDIDYMITIS.

Inflammation of the epididymis seldom occurs as a primary condition, being usually associated with orchitis, but the writer has seen cases in bulls in which these pus centres are invariably present, when castration is, of course, the most economical remedy. Blows or bruises are the most common cause. In cases where it is decided to save the generative organs, hot fomentations and cooling lotion should be applied to the scrotum, and if necessary the testicles may be suspended in a bag, thereby relieving tension. In addition, a dose of physic is indicated, and a course of salines given in food or drinking water. The diet should be low, with abundance of roots and green foods. Where the inflammatory condition is acute and suppuration has taken place, the pus must be evacuated as soon as its presence is indicated, and the cavity irrigated with antiseptics.

EPILEPSY.

The nearest approach to true epilepsy in animals is to be found in the dog, occasionally in the pig, but seldom in the horse. Endeavours must be made to locate the cause of the fit and to remove it if possible. If due to parasites, helminthics should be given; if due to teething, sedatives and salines are indicated. Sometimes the cause is difficult to trace, in which case a general line of treatment only can be followed. The bowels must first be unloaded—for the horse, aloes; for cattle, sulphate of magnesia; for the pig, sodium sulphate; for the dog and cat, cascara. When the animal is in the fit, care must be exercised to prevent it from injuring itself, and in severe cases the inhalation of amyl nitrite, chloroform, or ammonia is indicated. Subsequent treatment consists of fortifying the patient against future attacks by giving full doses of bromide of sodium combined with borax and zinc oxide. Later on, a course of strychnine and arsenic may be prescribed with satisfactory results.

EPILEPTIFORM FITS.

These must be treated on the same lines as those advocated for epilepsy.

EPISTAXIS.

Where the bleeding has its origin in the nasal cavity, the condition is not of serious importance. It may be unilateral or bilateral. If the former, the nasal cavity should be plugged with pledgets of tow attached to pieces of string to effect their removal, and soaked in alum, solution of perchloride of iron, or tincture of ergot, and left *in situ* from twenty-four to forty-eight hours. The cavity should then be irrigated with a mild antiseptic to remove blood-clot, etc. Where both nostrils are involved, one only should be plugged, the other being left to allow free respiration. The patient's head should be kept as high as possible and cold water or ice bags applied. Where the hæmorrhage is proceeding from the lungs, the foregoing local treatment is not only useless, but dangerous, inasmuch as in these cases plugging the nostril irritates the patient, and aggravates the pulmonary hæmorrhage. In recurrent cases of epistaxis, the patient's system should be saturated with lime salts—*i.e.*, lime water given in the food or drinking water, or a course of lactate of calcium should be tried.

EPIZOOTIC CELLULITIS. *See* Influenza.

EPULIS.

Neoplasms growing from the gums are occasionally met with in practice in horses, cattle, and dogs. They vary from small growths to huge swellings, altering the anatomical arrangements of the parts involved. The patient is cast, chloroformed, and the tumour removed *in toto*. Hæmorrhage, as a rule, in these cases is not severe. When the growth has been removed, the base must be severely curetted, and the subsequent lodgment of foreign matter, which acts as an irritant, reduced to a minimum by feeding the patient on sloppy food. In this manner the risk of recurrence is reduced, for the neoplasms are usually malignant in character—*i.e.*, sarcomatous, carcinomatous, actinomycotic or botryomycotic. In cattle, if the patient is in good condition, it is better economy to have it killed.

ERYSIPELAS.

For therapeutical purposes this disease may be divided into two groups—mild and severe. In the mild form a dose of physic is good routine practice, as it stimulates the lacteals and gets rid of an excess of toxins. Local hot fomentations may be applied, followed by the application of lotio alb. to which is added a little liquor carbonis detergens. In the severe form moderate doses of salines given at intervals are to be preferred. In either case these should be followed by a course of arsenic, iron, and quinine. Locally a cooling antiseptic astringent lotion is prescribed:

℞ Zinci Sulphatis	ʒii.
Liquoris Carbonis Detergens	ʒss.
Aquæ	q.s. ad O.i.

M. Ft. lotio. To be applied, after fomenting with hot water and common salt, night and morning.

Where the swellings are extensive, scarification is advised; this procedure relieves tension and at the same time permits transfusion of fresh serum to permeate the bacterial foci. It also assists phagocytosis. Further, scarifying the skin adjacent to the swelling has a similar effect, a procedure strongly to be recommended.

In cases of spreading erysipelas, a streptococcal stock vaccine should be injected preparatory to making an auto-vaccine. The swollen area and beyond it should be painted with tincture of iodine (double strength) or iodized petrol, or nitrate of silver solution 1 in 6 may be painted round the circumference on the healthy skin. Where toxic symptoms are in evidence, the administration of salicylic acid and quinine must be frequently carried out in large doses, while the injection of normal saline solution washes the blood of free toxins which may be present.

ERYTHEMA.

This is not a serious disease, and, except in those cases due to local irritants, the condition is symptomatic of gastro-intestinal derangements, when a dose of physic, preferably in saline form, is indicated. It may be that erythema is more common in practice than one realizes, for owing to the dark colour of the skin it is not visible, white skins only lending themselves to diagnosis. Where there are symptoms of itching and irritation, lotio alb. should be applied on cotton-wool. Occasionally it is seen as a sequel to distemper in the dog, and here a change of diet is indicated, and the following administered:

℞ Tincturæ Rhei Co.	℥i.
Liquoris Magnesii Bicarbonatis	℥viii.

M. Ft. mist. One teaspoonful night and morning.

EXOPHTHALMIA. *See* **Goitre.**

EXOSTOSIS.

Under this heading are included bony tumours. These may be simple, such as splints, or malignant, as in osteosarcoma. In the case of simple bone tumours, pressure brought about by the application of a blister will hasten their removal. In others, periostomy facilitates absorption. When dealing with malignant neoplasms, special surgical methods are required. The patient is cast, chloroformed, and all the diseased bone is sawn, chiselled, and curetted until the healthy structures are reached. The resultant cavity or cavities are then plugged with pledgets soaked in strong solution of tincture of iodine. On the first symptom of a recurrence the operation is repeated and more heroic measures adopted, while the thermo-cautery may be called into requisition and freely used.

In some cases in cattle it may be the best economy to get them fit for the butcher at once.

FAINTING.

Fainting may proceed from a lowered blood-pressure, often due to syncope or heart weakness, or it may be the result of a general anæmia or a sudden removal of blood from the brain. Whatever the cause, the heart's action must be stimulated and the blood-pressure raised; therefore the inhalation of ammonia is indicated, cold-water douches to the head, removal of the collar if the patient is a horse in harness, and the hypodermic injection of strychnine or camphor and caffeine over the heart. If the weather is warm and the sun shining, the patient must be placed in the shade, and if possible in a current of fresh air. If the animal is subject to fainting fits, rest, good food, and a course of iron and vegetable tonics will do much to effect a cure and prevent a recurrence.

FALSE QUARTER.

Where the deepest layer of the epidermis in contact with the coronary band (matrix) is deficient at the seat of injury, its horn-secreting properties are reduced to a negligible point, with the result that the horny wall immediately under the injury is defective both in quality and quantity. To make up for this deficiency is a difficult problem which awaits the surgeon. If there is a wound in the band with bulging edges, these should be cut away, and a strong, deep suture inserted on a horizontal plane. All blood having been wiped away and the surface painted with tincture of iodine, the part is smeared with tar, a pledget of tow laid on it, and a stout bandage fairly firmly bound round the top of the hoof.

This is left *in situ* for three days; the tar dressing is then reapplied and the part rebandaged for four or five days, when it is finally removed. Tar should then be applied to the coronet and hoof at the diseased part every two or three days for a considerable time; by this means dirt is kept out, and an artificial varnish supplied to the hoof. At a later date a blister may be applied with advantage.

FEEDING (ARTIFICIAL).

In all wasting diseases, or diseases running a long course, it is of the first importance to see that the patient's strength is supported and maintained by the administration of good food, so that when the crisis arrives sufficient stamina may be left in the animal to take it over the critical period; but the quantity of food ingested daily may be altogether insufficient for the body metabolism, in which case artificial administration of nutrients is called for. In veterinary practice the two methods usually adopted are *per oram* and *per rectum.* In the former, concentrated foods are administered in draught form. For the horse, ox, sheep, and pig, boiled gruels play a large part, such as linseed, oatmeal flour, and, to add to the nutritive value, milk, eggs, etc. For the dog and cat, milk, Glaxo, meat extracts, patent foods, cod-liver oil, and malt extracts. It must always be remembered, however, that forced drenching of sick animals beyond a reasonable limit is most unwise. There is nothing which nauseates a patient more than *over*-drenching. An ounce of nutriment taken voluntarily is more valuable than a pound given forcibly. There are certain conditions where it is impossible to " drench " an animal, in which case feeding *per rectum* is advocated. The rectum must be emptied of fæces, either by the hand or by a watery enema. Nutrient enemas consist in the larger animals of milk, eggs, sugar, and gruels to which is added 1 to 3 per cent. of common salt, the quantity administered at a time being 30 to 60 ounces two or three times daily. For the smaller animals, peptonized milk, glucose, albumen water, Benger's or Mellin's food, Glaxo, fats and pancreatin, etc., with a 1 to 2 per cent. solution of common salt added.

The quantity of enema varies according to the size of the animal from 4 to 20 ounces, and may be repeated three or four times *per diem.* It is advisable to insert the enema with a long tube as far into the bowel as possible, and when the operation is complete efforts should be made to see the animal retains it by keeping the tail firmly applied to the anus, by pressing the spinal vertebra over the kidneys with a brick or a piece of wood, or in the case of the horse by the application of a twitch.

The persistent administration of nutrient enemas sometimes leads to catarrh of the bowel mucosæ, in which case they should be stopped, and linseed oil to which is added a little lime water may be injected daily until the irritation is reduced.

FEVERS.

Fevers may be simple, such as those occurring in young horses recently brought in from grass, or when they are passing through dentition trouble; or specific, as seen in acute febrile diseases following upon bacterial infection.

General Treatment.—It is of first importance to see that the patient is comfortably housed and free from draughts. The surroundings must be healthy, affording good drainage with plenty of fresh air and sunlight. In the case of the horse, and particularly with hunters, the body should be clothed, the weight of clothing depending upon the atmospheric temperature, and the legs bandaged. The body must be well groomed and the legs hand-rubbed daily. The temperature of the box or stall should be as equable as possible night and day (55° F.). The diet, of course, must be light and easily digested, the patient always having free access to clean drinking water. Contrary to the views entertained by many practitioners, it is deemed advisable to conserve the patient's strength and stamina from the outset, for it must be remembered that an elevated temperature means an increased combustion, with the result that the body fats are the first to go, and then follow the proteins; the latter may be conserved by increasing the carbohydrates and hydrocarbons in the food. For horses, cattle, and sheep, grass, hay, oats, bran, maize, swedes, mangolds, carrots, parsnips, and potatoes; for the dog and cat, gravies, soups, milk, Glaxo, chicken, fish, tripe, patent foods, oatmeal, etc., form a useful selection.

Meat extracts, however, are best avoided, owing to their active ingredients throwing too much work upon the kidneys.

Special Treatment.—In all fevers there is a tendency to constipation; laxatives and enemas should therefore be practised at the outset, and saline laxatives are to be preferred to any others.

Cold spongings act very beneficially upon a patient, and in the case of the dog cold or tepid baths, according to the condition, are very useful. Where the temperature is abnormally high, antipyretics are indicated, the best of which are salicylate of soda, salicylic acid, aspirin, potassium chlorate, antimony tartrate, camphor, quinine, etc. Where there are indications of heart failure, hypodermic injections of strychnine, caffeine, and camphor are indicated, and in severe cases transfusion of normal saline solution, with brandy added, will be found beneficial.

FILARIA. *See* **Parasitic Diseases.**

FISTULA.

As a general term the word "fistula" covers a variety of conditions, and is somewhat loosely applied. For therapeutical purposes the writer proposes to divide these into two distinct groups—Group No. I., where tissues are involved, such as the poll, the withers, the sternum, the croup; Group No. II., where organs are implicated—the anus, the bowels, the rectum, the cheek, the œsophagus, the pharynx, the salivary glands, the udder.

Group No. I.

The two cardinal principles which must be applied here, and without which every other effort counts as nought, are free drainage and the complete removal of dead and diseased structures; these latter may be bone, ligament, or pus collections or concretions.

Poll—*Surgical Therapy.*—Poll-evil, when first seen, may be either open or closed. If the latter, and pus can be detected, lancing and evacuation are essential. Never wait for the abscess to burst, for it must be remembered that the longer pus remains in this region, the deeper it will burrow, by reason of its tryptic action, the more damage will be done to the sensitive structures, and the longer will recovery be deferred. The practitioner is, however, seldom consulted until irreparable damage to the tissues has been done by the necrotic influence of the pus; the skin gives way under extreme pressure from within, and an angry discharging sore is the result. Several sinuses may now exist, and the surgeon must acquaint himself with their extent and direction. This is best accomplished by putting a twitch on the patient, with which the head is raised by an attendant, thereby relaxing the ligamentous structures, so that the operator is enabled to insert his index finger freely under the funicular portion of the ligamentum nuchæ. If the sinus is not large enough to admit of this, it should be enlarged by the free use of a probe-pointed bistoury, for digital exploration is always much more satisfactory than probing. Having ascertained the extent of the diseased area and the structures that it involves, a line of treatment is decided upon. If the case is a severe one, the ligamentum nuchæ is usually necrotic in parts, or for want of a better term the condition may be described as undergoing calcifying necrosis. These areas give to the finger a rough grating feeling. In more advanced cases the cervical bones become involved, originating as an acute periostitis and ending in caries. In the most severe cases of all, by reason of the excessive accumulation of pus, burrowing takes place into the spinal canal, and may even extend to the meninges themselves. Obviously, in such cases treatment is useless. In the milder and recent cases the pus should be immediately evacuated by lancing, the horse's head raised, and the cavity irrigated with cold water under pressure from a hose-pipe. It is then flushed with a 5 per cent. solution of boric lotion to which is added lime water up to the strength of 1 in 20. The sinus or sinuses are then packed to the end with carbolized lint. This dressing should be repeated daily, and as the sinus fills from the bottom the packing may be more lightly applied. The surface wound should be the last to heal, and if necessary must be widened with the lancet. Where necrosis and sloughing have taken place, these diseased areas must be removed by the insertion of pledgets of tow soaked in a concentrated solution—perchloride of mercury or chloride of zinc—or by the free use of the knife and curette. The resultant cavity is then washed out with the hose-pipe, irrigated with normal saline solution, and the following capsule inserted:

℞	Proflavine	gr. i.
	Acidi Borici Bismuthi Carbonatis }	āā grs. v.
	Acidi Citrici	grs. x.
	Excipient	q.s.

M. Ft. capsule. To be inserted daily.

The cavity is then packed with gauze.

This procedure should be carried out daily for a week, after which, if the discharge becomes less, the cavity is packed lightly with gauze soaked in lime water and boric lotion, or B.I.P.P. may be used. In some cases, especially if the sinus or sinuses are laterally situated, a seton or drainage tube should be carried from the base of the sinus backwards and brought out at the side of the neck. If a seton is used, it should be soaked in zinc or perchloride of mercury solution, for by so doing a more patent artificial canal for drainage is made.

Where there is a persistent and obstinate flow of pus, the surgeon should make sure that no dead tissue acting as a bacterial focus exists; further, he should also note that the walls of the sinus or sinuses have not become unduly indurated. If these conditions are present, the free use of the knife and curette is indicated, after which calcifying agents such as the following should be applied:

℞	Acidi Borici Calcii Chloridi }	āā ʒi.
	Cretæ Preparatæ	℥i.

M. Ft. pulv. To be dusted freely into the wound daily, and plugged lightly with absorbent gauze.

A more recent and highly successful method of treating "poll-evil" is by medial incision, as advocated by W. R. Davis, and latterly by Williams, Hobday, and others. The animal is cast and chloroformed, the hair of the mane removed, the skin sterilized, and a mesial incision carried from the top of the occiput backwards 6 to 9 inches, and extending through the funicular portion of the ligamentum nuchæ. With the use of hook retractors, the lips of the resultant wound are drawn apart, thereby exposing the diseased underlying structures, which by the use of the knife and the curette are freely removed. It is then advised that the wound cavity has a more or less continuous irrigation of hyperchlorite solution applied to it from a receptacle situated higher than the horse's head, the tube leading from the douche-can being inserted in the wound and kept in position by a strap or cord fixed to the neck. After the elapse of ten days of this treatment the cavity will have healed sufficiently to permit of daily dressing with bismuth paste (B.I.P.P.) and light gauze packing.*

In those mild cases which are seen early, before pus formation is in evidence, hot fomentations, the application of cooling lotion, and the administration of a dose of aloes, are called for. Upon no account, where pus is absent, should the fistula be opened. In all cases of poll-evil, mild or severe, to facilitate recovery the animal should not be allowed to feed from the ground; consequently turning a patient with poll-evil out to grass retards recovery. The region of the poll must be placed as nearly as possible in a state of rest, and all stretching which follows when an animal feeds from the ground is inimical to recovery.

Withers—*Surgical Therapy.*—The fundamental principles as laid down for the treatment of poll-evil are equally applicable here. It may, however, be pointed out that owing to the anatomical arrangement of the withers drainage can be carried out more successfully as a rule. There are various phases, all of which tend to culminate in true fistula of the withers. Thus, the practitioner may be called in to see a case consisting of a unilateral or bilateral fluctuating swelling, the content of which is usually serum, or the swelling may be hard and fibrous, while in advanced stages signs of ulceration with blood-stained pus may be noted. These latter cases may or may not be botryomycotic in origin. In other cases the swelling may be due to a true pus formation, in which condition there is usually a discharge when seen by the practitioner. Where the disease is of a serous abscess nature, lancing is not advised. The skin should be sterilized and the fluid aspirated by a large sterile syringe. The skin is then bathed with cold water and iodine liniment rubbed in daily. Where there is a large fibrous development containing ulcerating centres, the animal should be cast and chloroformed, and an elliptical perpendicular area of skin removed, the underlying fibrous growth being carefully dissected away in pieces. As there is usually a considerable amount of hæmorrhage, a sufficiency of artery forceps should be at hand. Where the spinous processes of the vertebræ, the cartilaginous prolongation of the scapula, the spine of the scapula, or the scapula itself, are involved, these parts should be freely curetted, dressed, and the edges of the skin sutured. Subsequent treatment consists of the principles laid down for the treatment of an ordinary wound. Where pus has burrowed and true sinuses have formed, these must be followed up to their blind end, laid open, and their walls scraped and packed with bismuth paste and gauze.

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* It is not always easy to carry out this irrigation in practice. The procedure adopted by the writer in many cases has been as follows: After removing all diseased tissue, the wound surface is well rubbed with common salt, and the animal allowed to rise. On the third day daily irrigation takes place with the hose-pipe, after which the wound is dusted with boric acid 1 part, iodoform 1 part, prepared chalk 8 parts, and this is continued until the wound has healed.

A troublesome form is sometimes met with in practice in which pus has burrowed between the shoulder-blade and the ribs, and there may be little or no outward manifestation of a swelling. In such cases careful probing is necessary to ascertain the extent and direction of the sinus. A needle 15 to 18 inches long and armed with a seton or drainage tube is passed from the top of the shoulder-blade downwards along the course of the sinus to its most dependent point, bringing it out behind the shoulder. Subsequent treatment consists of irrigating the sinus with *mild* antiseptics. In all phases of fistula of the withers it is imperative that the animal should be kept indoors until recovery is complete, for it is the invariable practice of a horse with this condition, when turned out to grass, to commence rolling, and owing to the prominence of the withers, bruising is sure to follow and recovery is consequently retarded.

Sternum—*Surgical Therapy.*—In the writer's experience fistula of the sternum is always botryomycotic in origin, and as such is a most troublesome disease to cure. Nothing short of heroic measures is demanded. The presternal region is usually considerably swollen and showing one or more discharging wounds. If these are probed, the sinuses will be found to lead up to the sternum. The patient having been cast and chloroformed, each sinus is laid open, and where there is an excess of fibrous tissue surrounding confluent sinuses or pus foci the whole growth should be dissected out *en masse*, laying bare the presternum. Hæmorrhage will be considerable, but it is imperative to remove all post-inflammatory and infective material. Where necrotic patches are found on the sternum, these must be severely curetted. Common salt is then rubbed in all over the wound surface; this will increase the hæmorrhage and produce a salutary flushing. The whole surface is now painted with double strength tincture of iodine, the cavity packed with carbolized tow soaked in iodo-benzene, and the edges of the skin brought together with strong, deep button sutures. In three days' time the packing is removed and the wound left open, being irrigated twice daily with salt and water, followed by painting with tincture of iodine. If excessive granulations form, these may be painted with the following:

℞ Hydrargyri Perchloridi	grs. xx.
Acidi Hydrochlorici	♏x.
Alcoholis	℥i.

M. Ft. spts.

Croup—*Surgical Therapy.*—Fistula found in this region must always be a troublesome condition to cure by reason of the difficulty that exists to obtain free drainage. In fact, drainage as it is generally understood is practically impossible, and the operator must resort to dry packing and calcifying dressings. The direction and extent of the sinus having been ascertained, the outer wound is enlarged, all necrosed tissue freely curetted, and dead sloughs removed. The whole cavity is then dried with cotton-wool (medicated) plugs, and the following drying powder freely dusted into the cavity, which is then firmly plugged with gauze:

℞ Acidi Tannici Acidi Borici Pulveris Iodoformi	āā ʒi.
Cretæ Preparatæ	℥i.

M. Ft. pulv.

This dressing should be repeated daily for a week or ten days, the plugging being less firm on each application.

Group II.

The great contrast existing between Group I. just described and those of the group under consideration is to be found in the fact that while in the former ligamentous, cartilaginous, and bony structures are involved, which in themselves are structures of low vascularity and consequently deficient in bacteriotropic properties, the latter are highly vascular and richly cellular; consequently bacterial aggression is not so active and can usually be more easily overcome.

Anus—*Surgical Therapy.*—Fistula of the anal region is invariably the sequel to accidents during difficult parturition, injuries from spiculæ of bone, etc. The prime factor is a wound, and if this is neglected a troublesome fistula may follow, demanding immediate surgical interference.

The rectum is emptied of all fæces and an antiseptic enema given and then removed. A grooved director is passed into the wound and along the sinus, which is laid bare to its full extent by a blunt-pointed bistoury. In some cases a lateral branch or branches may be present. These must be searched for and opened. When the sphincter ani is involved, no hesitation need follow its resection if care is taken to cut the muscular fibres at *right angles and only in one place.* When granular deposits are present, these must be curetted freely. Subsequent treatment consists of packing the cavity lightly daily with gauze soaked in a mild antiseptic, after irrigation with normal saline solution, and the patient placed upon a concentrated laxative diet.

Bowel—*Surgical Therapy.*—A traumatic anus in animals is a troublesome condition to rectify, owing not so much, as a rule, to the size of the wound, but to the continual outpouring of unwholesome ingesta or fæces. The ideal surgical treatment, of course, would be to cut through the parietes, expose the injured bowel, and close the parietal and visceral wounds by sutures, and in cases where other treatment fails this method should be adopted. It must be pointed out, however, that in some cases animals are little inconvenienced by a bowel fistula, and the writer has known of at least two cases which lived for years discharging food through the abdominal wall in small quantities. In these cases suturing the wall after thorough curetting was practised, but the sutures gave way, leaving a bigger wound to be dealt with; then crucial firing was practised, the net result being a *status quo ante.*

Rectum—*Surgical Therapy.*—The principle of treatment laid down for *anal* fistula is applicable to rectal fistula.

Œsophagus—*Surgical Therapy.*—As in fistula of the bowel, œsophageal fistula is also a troublesome disease. The whole fistula must be curetted and the mucous membrane sutured with catgut; the outer coat of the gullet is next sutured, while the skin wound remains open, through which the deeper wound is dressed. In the meantime the animal is fed *per rectum*, and only occasionally a little concentrated gruel or hay tea allowed as a drink. Sutton recommends giving the animal sugar and water to drink, some of which passes through the wound and acts as an antiseptic dressing, and this, being an excellent idea, is recommended.

Pharynx—*Surgical Therapy.*—Fistula in this region is invariably the result of an injury, the wound not healing properly owing to the lodgment of oat-heads and other ingesta. The writer has had under his observation an obstinate case originally due to a troublesome strangles abscess. He cast and chloroformed the patient, and cut down upon the blind end of the fistula from without, when a mass of pus concretion was found. This was removed, the sinus curetted, and firmly packed with carbolized tow right up to the pharyngeal end. The patient was fed *per rectum*, and allowed only ice water and gruel occasionally to drink. Recovery took place in a little over fourteen days. When the fistula is slight and uncomplicated, treatment is advised from within by laying the fistula open to the end, curetting the edges, and restricting diet.

Cheek—*Surgical Therapy.*—If the fistula is of long standing, the edges will be hard and callous; these must be thoroughly scraped and brought together by deep sutures, and the cheek immobilized by a pitch plaster applied along its whole length. The pitch should possess a certain amount of elasticity, which is acquired by the addition of a little common soap. The pitch is applied with a stick or spatula, and then pieces of chopped tow are added and more pitch applied, and so on, until a fairly thick layer has accumulated. A circular hole is now made in the pitch (after it sets) over the seat of the wound, and through this dressings are applied, and the opening plugged with sterile cotton-wool. When union is complete—*i.e.*, in about seven to ten days—the sutures may be removed. The pitch usually remains adherent from fifteen days to three weeks.

Parotid—*Surgical Therapy.*—The outflow of saliva from the parotid gland as the result of an injury or a surgical operation is of little importance. The writer has on very many occasions, when removing actinomycotic neoplasms from the parotid region, cut deeply into the gland parenchyma, with the consequent secretion of saliva from the wound for two or three days, and without any special treatment the flow will stop spontaneously. Not so, however, in the case of fistula of the parotid duct, the most common seat of which is to be found where the duct crosses the border of the mandible. If the injury is a recent one, the edges of the duct are brought together by fine interrupted sutures, after painting with tincture of iodine. The skin is then sutured, and the whole area covered with collodium and cotton gauze or wool. When the condition is one of long standing, more trouble awaits the surgeon. In the first place, he must ascertain if the portion of the duct beyond the wound which passes into the mouth is still patent—if it is, he should proceed as in recent injury; if it is not, several alternatives await him. An artificial channel may be made into the mouth from the severed end of the duct. This is done by the insertion of a fine tape or small-calibre drainage tube, which remains *in situ* for several days—until, in fact, an artificial canal has been effected. The saliva is then diverted along this channel by closure of the outer outlet by suturing the wound and covering it with collodium or some other adhesive. When the wound is sufficiently healed, no recurrence follows as a rule; nevertheless, there is sometimes to be found an obstinate case which defies all forms of therapy. In such a case the duct is ligatured close to the gland. The writer prefers the application of two ligatures about one-eighth of an inch apart, applied fairly tight. Some authorities now advise the injection of irritants. For some years, in stubborn cases, the writer has cut down upon the gland at its lower third, the resultant cutaneous and visceral wounds being left open and painted daily with tincture of iodine. By this procedure the salivary overflow is drained off, and the consequent tension by the damming back of saliva on the duct is nil. In a week or ten days the wound will cicatrize and the gland atrophy.

Mammary—*Surgical Therapy.*—Wounds in the active udder and milk-duct lead to a waste of the milk-supply and call for surgical interference. Where penetration has taken place into the parenchyma of the gland, and the surgeon is called in early, asepticizing and suturing closely is all that is, as a rule, required. If the wound is neglected and has become septic, in all probability the fistula will count but little, for the milk will become suppressed (mastitis) and the activity of the quarter lost. Where invasion has not extended to the udder, but the edges of the wound are hard and turned in, they must be scraped and closely applied sutures inserted. It is surprising how rapidly wounds in the udder heal. Where the fistula is located in the milk-duct, and is of recent date, it should be made aseptic and then firmly sutured. Interference in the healing process is considerable when it is remembered that the teat has to be disturbed twice daily in the process of milking. By careful milking, however, this can be reduced to a minimum. If the injury is situated near the end of the nipple, milking with finger and thumb lessens disturbance to the wound. If the fistula is higher up, the hands of the milker must be smeared with carbolized vaseline before milking. Teat siphons in these cases are, in the writer's opinion, too dangerous to be used, unless in skilled hands.

Vaccine-Therapy.—In the foregoing fistulous conditions, save those belonging to the mildest cases, the resources of the surgeon and the patience of the client are taxed to the utmost limit. No stone should therefore be left unturned, and vaccine-therapy should form an important item in the curative rôle. Surgical treatment alone may effect a cure; vaccine-therapy alone may record a recovery. In some cases the one without the other leads to disappointment. The truth is, both methods have their limitations. Thus, the vaccine-therapist should not expect by this line of treatment to remove dead sloughs or necrosed pieces of bone firmly imprisoned in a semi-closed cavity; while, on the other hand, the knife can only remove structures up to a point, beyond which it may not go. The bacterial flora, as might be expected, in fistulous conditions are numerous and varied and of the pus-producing type; thus, we find streptococci, staphylococci, *B. coli*, *B. pyocyaneus*, *B. pyogenes suis*, and bacilli belonging to the diphtheroid group; and among the more specific organisms are to be found actinomyces and botryomyces. A careful bacteriological examination of the pus must be made at the commencement, the character of the aggressive bacteria noted, and from these an *auto-vaccine* prepared. All fistulous conditions being of a more or less chronic nature, *full* doses of vaccine can be safely given throughout, and in the meantime the patient should be fed up with the most nutritious foods.

FLEAS. *See also* **Parasitic Diseases.**

The dog is the most common host of the flea. The whole body should be well washed with the following shampoo:

℞ Olei Staphisagriæ Olei Eucalypti	āā ℥i.
Linimenti Saponis	O.i.
Aquæ	O.i.

M. Ft. lini.

The body is well lathered with this, leaving it on the skin for fifteen minutes, and the animal then given a hot bath. The treatment should be repeated in three or four days. All rags, brushes, and kennels must be thoroughly disinfected.

FLUKE. *See* **Parasitic Diseases.**

FLUX. *See* **Dysentery.**

FOLLICULAR MANGE. *See* **Parasitic Diseases.**

FOOT AND MOUTH DISEASE.

This being a scheduled disease, curative treatment is not permissible. Prophylaxis consists of isolation, slaughter and burning, thorough disinfection, and the prevention of anything acting in the way of a carrier.

FOOT ROT (IN SHEEP).

Where a few sheep of the flock are affected, they should be isolated from the healthy ones and each foot individually attended to. All loose and diseased horn is pared away, the accumulated dirt and debris removed, and a caustic dressing lightly applied, such as perchloride of iron or muriate of antimony. As a prophylactic or where a large number of the sheep are affected, a foot-bath is advised; the solution may be arsenic or copper. Arsenic and washing soda 1 pound each, water 50 gallons, or 1 part of sulphate of copper and 50 parts of water (Williams). The ground on which the sheep are run should be as high and dry as possible.

FOREIGN BODIES.

These are found in the various tissues and organs of the animal body. Some cause no inconvenience and remain undiagnosed during life; others give rise to grave symptoms demanding immediate surgical interference.

Bowels.—In the horse, calculi, oat-hair balls, dust balls, and sand are the most common, but unless they cause obstruction or active irritation they exist undetected and no treatment is called for. When diagnosed, oily, laxative, and long-distance enemas may give relief. If there is abdominal pain, the treatment for colic is indicated. Where they are detected in the posterior bowels, the practitioner may be fortunate enough to effect their removal by digital manipulation from the rectum, or an operation through the flank may be embarked upon. In the dog and cat pieces of bone, needles, etc., find their way into the intestines. If no grave symptoms are present, medicinal paraffin and enemas should be prescribed. If obstruction is in evidence, the abdomen must be opened and the foreign body forced backwards. Failing this, the bowel is cut into and the obstructing object removed. Where a pin or needle finds its way into the bowel, raisins greased well with lard are forced down the dog's throat at intervals. Sharp objects may also find their way through the flank, when their removal by forceps is usually an easy matter.

Eye.—In cattle after feeding on oat-chaff the lodgment of the chaff is very common, setting up ophthalmia, conjunctivitis, etc. To remove these a pair of bull-dogs should be inserted in the nose and firmly held by an attendant. An eye speculum is inserted and the head held at such an angle that the chaff, which is usually resting on the cornea, comes well into view. It is then easily picked off with a fine pair of forceps, or a little tar or treacle may be placed on the apex of the index finger and the chaff touched with this, when it is usually dislodged.

In those cases where the inflammatory exudate is great the chaff may become transfixed, and here the eye should be anæsthetized with cocaine, after which removal with a fine curette is indicated.

Œsophagus.—In horses and cattle, roots, apples, etc., commonly find their way into the gullet and become fixed. Treatment in these cases will be found under the heading of Choking.

Pharynx.—Pieces of wire, needles, bone, sharp sticks, and even (in cattle particularly) roots and apples, become sometimes lodged in the pharynx. In the dog and cat a mouth-gag is inserted, and if the foreign body is visible removal with long forceps is usually easy. Where a difficulty in location is encountered, the introduction of an auroscope into the mouth may bring the object into view. In the larger animals, after inserting a mouth-gag, the hand is passed into the pharynx and the object grasped and withdrawn. Where this is impossible and the object is a piece of root or something of that kind, the probang may be passed with safety and the object forced into the stomach.

Mouth.—In cattle and horses, thorns, wire, leather, soles of boots, pieces of stick, and in dogs and cats, bones, needles, etc., are all common objects found in the mouth. The attendant's attention is usually drawn by the animal salivating, and the saliva may be blood-tinged. In the dog and cat there is usually much shaking of the head and digging of the forepaws into the lips.

In cattle, and sometimes in horses, it is no uncommon thing for a piece of stick to become fixed crosswise in the roof of the mouth, the ends being rigidly held between the molars. In the same way, in cattle, soles of old boots and shoes are often lodged in the roof of the mouth, and may remain there for days. Removal in these cases, after insertion of a mouth-gag, is usually easy.

Rumen.—The lodgment of foreign material in the rumen of cattle is by no means uncommon, and the variety of such material is almost endless. To enumerate a few—nails, wire, leather, sand, lead, dust, balls, hair-balls, and even placenta, usually from the recently calved cow. Some foreign bodies are sharp and travel to other organs, as, for instance, the heart, where, of course, no treatment is of any avail. Others may point under the skin, when they should be cut down upon and removed, the resulting opening being treated as an ordinary wound. Where the practitioner has definite data to go upon, rumenotomy offers the only chance of giving good results, and the operation must be performed as early as possible (see Rumenotomy).

Subcutaneous Tissue.—Wires, needles, splinters of wood or iron, nails, shot, etc., may all be found under the skin. Wherever a foreign body is detected or suspected there, the first duty of the surgeon is to remove it. Punctured wounds must always be explored to their end to make sure that no foreign body exists therein. Deeply lacerated wounds must be probed in every cavity or recess for the lodgment of foreign elements. In some cases the body may be so large as to necessitate the enlargement of the wound to admit of removal. When it is removed, the cavity is freely irrigated with normal saline solution, facilities being made for free drainage. Where small shot are present, endeavours are made to remove all pellets by dissection with the help of duckbill forceps; but it must be pointed out that if the process entails the loss of much tissue it is better surgery to leave a few pellets *in situ*, for it is a fact that many are comparatively sterile, and these give little inconvenience. Sporting dogs accidentally shot have been known to carry pellets for years, their presence being easily felt by manipulation of the skin.

"FOUL." *See* **"Whitlow."**

FRACTURES.

There is no branch of surgery which calls for greater caution and sounder judgment than in the case of fractures when the practitioner is consulted to give an opinion as to whether the animal should be treated or destroyed. The conditions involving one case may be so diverse from that of another that it becomes quite impossible to lay down any hard-and-fast rules as to whether the case should be treated or not, but the following general principles should have due consideration:

1. A young animal makes a better subject than an old one.
2. A phlegmatic patient is less irritable than a nervous one, and is more suitable for treatment.
3. In the case of a horse, one which takes kindly to slings is more amenable to treatment than one which does not.
4. Simple fractures set better than comminuted or compound fractures.
5. The earlier the practitioner undertakes the case, the better are the ultimate results.
6. Amateur interference prior to expert assistance being called in is inimical to recovery.
7. In the case of animals of small value the probable cost of treatment should be gone into to consider whether the proposition of treatment is economically sound or not.
8. If the subject is a horse, the practitioner must always have in his mind what the ultimate result of the treatment will be. He may succeed in securing a complete union, but with permanent lameness as a result, in which case the animal is useless as a working proposition, the only exception here being that of a mare which may be used for stud purposes.

For the descriptive principles of treatment fractures may be divided into simple and compound. There are certain cardinal data which must be observed in the treatment of all fractures. If the practitioner is called in some hours after the injury, considerable swelling will be in evidence, particularly in the case of the limbs. This swelling may be so great as to obliterate the diagnostic symptoms of fracture, and to set a limb straightaway in this condition is to court disaster. The swelling is due to serous effusion, or perhaps hæmorrhage, or both. Tightly bandaging an area in this state exerts considerable pressure, which in itself retards absorption; but what is perhaps more important, the pressure interferes with the circulation, leads to strangulation, and even to local death. Clearly, then, before attempts to set a fracture are made, the effused fluid should be removed by gentle massage, the parts covered with a layer of cotton-wool, and an equable bandage applied. The following day the bandage is removed, and the part remassaged and rebandaged. As soon as absorption has taken place, the bone is ready for setting. In setting a fracture, the greatest care must be taken to see that the ends come into complete apposition; also that the point of the toe is in exact alignment with the central axis of the limb. The next point to consider is the most suitable method of keeping the fractured ends in perfect apposition. There is an idea in the minds of many practitioners that *complete immobility* is essential to complete recovery, and with this object in view they firmly bind up the fractured area, and even include one or more joints above or below the injured zone. A whole limb may therefore be kept in this rigid state for one to two months. In the view of the writer these extreme methods are entirely wrong, and against the principles of Nature. A certain amount of mobility, not only in the joint above and below the fracture, but also a slight degree of freedom, should exist between the fractured ends, and so long as the ends remain in exact apposition this slight movement facilitates Nature's efforts in effecting a union. Further, where rigid fixation is aimed at, there is always a liability, even if the hollows are well padded, to cause undue pressure upon prominences. In practice, therefore, the medium channel should be struck. For immobilizing a fracture various appliances and materials are used, and each veterinary surgeon has usually his own preference. Thus, some use plaster of Paris, others gum, starch, pitch, splints, stout leather, and even tin. Where splints are used, the greatest care must be exercised in their application. Undue pressure upon prominences often leads to suppuration, sloughing, and grave complications. These risks may, of course, be reduced by padding the limb carefully, and also the splints at their ends. Speaking generally, the writer has discarded the use of splints, and almost invariably uses in their place *silicate of potash* bandages. (See also Bandages.)

As this solution takes some time to set, it is advisable to fix the limb *temporarily* by applying a splint or splints over the bandages and removing them later when the solution is set.

In treating cases of compound fracture, the first consideration is to remove all detached and semi-detached hard and soft structures, after which the wound is irrigated with normal saline solution and then thoroughly saturated with weak boric, hypochlorite, or proflavine solution. The ends are then brought into apposition and the limb fixed, as in simple fracture. A window is now made in the bandage directly over the wound, and through this aperture free drainage is permitted and regular dressings applied. The opening may be covered with boric lint and lightly bandaged. Fractures usually take from one to two months to set, during which time bandages should be left undisturbed. Should, however, discoloration or moistening of the bandage take place, it must be immediately removed, as such a condition invariably suggests pus formation or bleeding. It is therefore of first importance that practitioners should note the skin of a limb should be, before setting, perfectly dry and clean. Also that no grit or debris of any kind is imprisoned between the bandage and the skin.

Coccygeal Vertebræ.—Occasionally in practice a case is seen of broken tail in the horse, ox, or dog. If the fracture is simple, clipping off the hair and bandaging the tail to the distal end is all that is necessary. If the fracture is a compound one and low down, it is not desirable to attempt setting, amputation being the quickest and best treatment.

Cervical Vertebræ.—Fractures occurring in the bones of the neck, considering their narrow outline and the way in which they project from the trunk, are not so common as might be imagined, and when they do occur there is distinct evidence of extreme violence. The shortness of each individual bone, and the manner in which it is joined to its fellow giving great flexibility to the whole column, accounts for this comparative immunity. When the body of a cervical vertebra is fractured, the spinal cord can scarcely escape injury, the net result being hopeless as far as the majority of cases is concerned. Where an incomplete fracture exists, which during life can only be based upon hypothesis, treatment should be attempted with a fair prospect of good results ensuing. Should there be, however, any sign of spinal compression taking place, the patient may wisely be destroyed. Where the processes are fractured, much better prospects of recovery exist. The patient, if a horse, is placed in a roomy box. He is fed and watered from a manger placed at a height most suitable to him. Hot fomentations are applied to the parts to relieve tension, and absolute quietness ordered.

Cranial Bones.—Fractures here are due to direct violence. Where an animal rears up and falls backwards, striking his poll against the ground, fracture of the basilar process of the occipital bone is the usual result, with fatal consequences. The bones of the skull may, however, be fractured in other regions; thus it is no uncommon occurrence to find fracture of the supero-anterior aspect of the skull. These fractures may be simple or compound, with or without depression. In cases of simple fracture without depression the main object consists of treating the cerebral phenomena consequent upon concussion as they occur by administering a dose of physic, full doses of potassium bromide, the application of ice to the seat of injury, and absolute quietude. In simple fracture with depression an incision, usually crucial, is made in the skin over the injured area, which is then dissected back, exposing the depressed bone. At the border of the fracture a small hole is made with the trephine close to the injured bone, through which a bone lever is passed, the depressed bone being carefully raised to its proper level. It is scarcely necessary to add, while this procedure is being carried out the patient must be kept absolutely quiet, and, if necessary, cast. In those cases of compound fracture without depression pus formation is our greatest danger; hence it is essential that the patient should be seen as soon after the injury as possible, and that rigorous sterilization of the wound is carried out forthwith. Where dirt and debris have been driven into the wound, the difficulty of treatment is greatly increased. Here the free use of the curette is indicated, after which the wound is well irrigated with normal saline solution, to which is added 10 per cent. citrate of soda. It is then washed out with hyperchlorous acid solution, painted with tincture of iodine, dusted with iodoform, lightly plugged with absorbent gauze, and bandaged. This dressing is left for twelve hours and then removed. The wound must afterwards be painted daily with tincture of iodine, packed and bandaged. In addition, ice bags may be applied with advantage. Where the wound is small, it should be enlarged if the drainage is not good. Where depression is an added complication, the same procedure for simple fracture with depression must be carried out. Again, hernia of the brain is an occasional sequel to compound fracture. The writer has met with two cases where it was necessary to slice off the protruding brain part. One case made a good recovery and the other died.

The brain being a delicate and essential organ, it is important that our methods, surgical and otherwise, are conservative and antiseptic. Thus, the skin before operating must be rendered aseptic, all instruments sterilized, and the operator's hands made as sterile as possible.

Thoracic and Lumbar Vertebræ (Broken Back).—Fracture without displacement is sometimes amenable to treatment, in which case locomotion is not sufficiently interfered with to make the patient helpless, for it is conceivable that fracture of the body of a dorsal or lumbar bone may exist without grave spinal symptoms being in evidence. On the other hand, the slightest injury to the spinal cord following fractures produces serious consequences, which cannot be overlooked, and the writer is of opinion that those cases of so-called broken backs which make complete recoveries are errors of diagnosis.

Fracture of the *dorso-lumbar bones*, with evidence of slight spinal disorganization, are, however, well worth treating, especially if the patient is young. The animal should be put into a roomy loose-box, bedded with moss litter, sawdust, or short straw, and given a dose of physic. Hot fomentations in the shape of hot rugs applied to the loins relieve tension and are comforting. After three or four days a charge may be applied to the loins, consisting of pitch, resin, soap, and chopped tow. Care must be taken not to apply this too hot, as it will make the animal cringe, and in so doing probably cause displacement of the fracture. In a couple of months the patient may be turned out to grass, preferably in a paddock free from gripes and hollows. In cases of fracture with displacement treatment is generally futile, and the wisest economy is to order the animal's destruction. In treating "broken back" slings are not, as a rule, to be recommended, in the writer's experience.

Prevention.—In casting horses for operation, some authorities recommend a back strap, and it may be useful in town practices where casting space is limited. Although the writer has cast some thousands of horses without any extra precautionary measures, he has never had the misfortune of broken back. The procedure adopted is to cast the animal in an open field, and when down to insist on the head being kept well back. This position is attained throughout the operation by a strong attendant kneeling on the head and neck, whilst another keeps the head drawn back with the halter rope, and a third attendant can be usefully employed pulling the tail in the same direction as the halter rope.

Femur.—Fracture may take place in the articular head, shaft, and trochanters. In horses, wherever the fracture is situated, prognosis must be very guarded; it is, indeed, doubtful whether a horse in such a condition is of any economic value. Treatment, therefore, should not be lightly embarked upon, the main reason being that the bone is deeply embedded in sets of important muscles which largely prevent artificial fixation being properly carried out, and, further, the powerful traction exercised by these muscles thwarts every effort to obtain and maintain the broken ends in proper position. In the case of a valuable young mare used for breeding purposes, where treatment is attempted, slinging is advised and a stout bandage* applied above the hock, to which two weights are attached, one on the inside, the other on the outside, of 14 or 28 pounds each, according to the size and contractile capacity of the muscles, which contractibility these weights are intended to overcome. After this the whole quarter and loins must be thickly plastered with pitch and tow, and the patient kept in this position for a month or six weeks.

In cattle the patient should be placed in a loose-box and the whole hip area plastered with pitch. A union of a sort takes place, the leg being always shorter, but the animal can generally be fattened for the butcher. The muscles of the quarter, of course, atrophy considerably.

In the case of the dog, this patient is placed under chloroform, which causes relaxation of the muscles. A stout band is then placed between the hind legs, and firmly held over the loins by an assistant, whilst another attendant pulls the leg, by grasping the foot, in an opposite direction slightly backwards, and while in this position the hip, quarter, and whole leg right to the foot is placed in a pitch plaster. A porous bandage is then applied from the foot up to the hip, carried over the loins and fixed there with more pitch, brought under the groin and round the opposite hind leg, bringing it again over the loin and fixing, finally winding it round the fractured limb. It is most important to note that the patient must be kept in this position until the plaster becomes absolutely rigid. The plaster should remain on for a month at least.

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* The bandage material must be soft enough to prevent circulatory strangulation, and the weights must also be regulated to ward against this complication.

Frontal and Nasal Bones.—Fracture of these bones is due to great violence as a rule; consequently the fracture is invariably compound. If the patient is seen early, much may be done to restore the depressed pieces to a normal position by the use of forceps and the bone elevator, suturing the skin and treating the whole as an ordinary wound. Where the case has been neglected at the outset, or where the fracture is comminuted beyond repair, it is advisable to remove all loose or somewhat loose pieces of bone, bringing the edges of the skin together over the gap. Where the underlying structures are badly involved, as, for example, the ethmoidal prolongations, it is much better to remove these and all blood-clot. This procedure facilitates healing, and reduces to a minimum the risk of the horse making a nasal stertor.

Humerus.—The principle of treatment laid down for fracture of the femur is applicable to fracture of the humerus, and as the difficulties to be overcome are on a par, if not so pronounced, prognosis must be almost as guarded. The muscular antagonism not being so great, however, "weighting the limb" as in femur fracture may be dispensed with at the outset; but if it is found necessary later, it should be adopted without hesitation. The whole shoulder must be thickly plastered with pitch or silicate of potash—the latter is especially useful in dogs and small animals; the former in horses and cattle. The horse should be slung from the first. The plaster need go no further down the limb than a few inches below the elbow. In the case of the dog and cat, however, a soft bandage must be applied from this point, extending down to the foot, to prevent circulatory strangulation, so common in small animals in these cases. Such a bandage supports the limb, but does not immobilize the joints it covers. If the humero-scapular or humero-radial joints are involved, treatment in the horse is useless. In small animals and in cattle it may, however, be attempted.

Inferior Mandible.—Fracture of the lower jaw may take place through the symphysis or the rami. It may be simple, but is more often compound. Fracture of the body involving a small corner and one or two incisor teeth is often seen; in this case all food particles, loose pieces of bone, and blood-clot, are removed by irrigation with a mild antiseptic, forceps, and cotton-wool, and the displaced bone brought into its normal position and retained there by strong wire wound round the corner incisor and fixed to a fixed incisor or first molar, or both. Where the incisor teeth are missing from the fractured piece, a small hole is trephined in the bone, through which a strong wire is passed, fixing it to a tooth *in situ.* The patient is then fed on slops, and for the first week or two kept on the pillar reins. Where the body is fractured longitudinally through the symphysis, wiring the incisor teeth is necessary, and where increased rigidity is required, the two first molars on the lower jaw may be firmly fixed with strong wire. In complete horizontal fractures of the body it is usually necessary to trephine four holes, one in each ramus, and the others in the displaced bone, through which wire is passed and closely joined together. This treatment should be augmented by passing wires from the incisors to the molars one on each side. Fractures of the rami are usually the result of direct violence, such as a kick or heavy blow. Here, also, boring holes and fixing by passing strong wire through them is necessary. The writer much prefers, as a general rule in these cases, fixing the bones by wire instead of the more cumbersome methods frequently adopted—cradles, splints, plaster, bandages, etc.; but it must be pointed out that the success or otherwise of the adopted treatment largely depends on the operator himself.

Tarsal Bones.—In the larger animals treatment is usually unsatisfactory, particularly in the horse, where the great after-tendency is ankylosis and permanent lameness, rendering this animal of little economic value save, perhaps, in the case of a mare used for breeding purposes. In cattle, however, treatment may be attempted if the fracture is a simple one. Whether the fracture is confined to the small bones of the hock or the calcaneum, it is of first importance to see that the hollows of the hock are filled up by even rolls of tow soaked in pitch plaster and applied while fairly hot. The whole joint is then covered with a layer of cotton-wool and bandaged moderately firmly, the bandage having been previously soaked in silicate of potash solution. In the dog and cat a similar treatment is applied, but the practitioner should warn the owner that a permanent ankylosis, and consequent permanent lameness, is to be anticipated. In these animals, after setting the joint, a soft bandage is applied from the hock to the foot, to prevent capillary strangulation, and it is necessary to see that pledgets of cotton-wool are inserted between the claws, and also between the dew-claws and the skin, to prevent chafing.

First and Second Phalanges.—If the fracture is simple, non-comminuted, and confined to either bone, setting may be accomplished with a fair amount of success. If comminuted or displaced, the animal should be destroyed. A layer of cotton-wool is applied to the skin from the coronary band to the fetlock-joint, and over this several layers of bandage soaked in silicate of potash are wound. When the hollow between the fetlock and the coronet has been filled up, the bandage is extended upwards to include one half of the metacarpal bone, special care being taken to note that the exact normal position of the foot is retained, an outward or inward rotation being very undesirable. To obviate this, the surgeon should stand in front of his patient a few times when bandaging the fracture, and the bandage should be carried down far enough to embrace the heel bulbs and one half of the wall of the hoof; then if necessary, when all the bandaging is complete, two lateral temporary splints are applied, extending from the hoof half-way up to the knee. These may be removed in a few hours, after giving time for the plaster to set. In young horses the bandages are removed in five or six weeks, whilst old horses require from six to eight weeks. Unfortunately, a pronounced degree of lameness is often the visible result, requiring repeated blistering, deep firing, and even neurectomy and a long rest. Although it has been already pointed out, the writer would like to again emphasize here the great importance, in a case where early setting has been deferred, of getting rid of the effusion consequent upon the fracture, by bandaging and massage, before attempting a permanent setting. If this precaution is not taken, an excessive exostosis takes place, which increases and prolongs the degree of post-injury lameness. The writer does not consider slinging advisable as a general rule, for a horse or an ox with fractured pastern takes great care of the injured limb, and if moderate immobilization has been made, and the animal placed in a roomy loose-box with short bedding, it will not interfere with the reparative process. Later on, if the weather is suitable, the patient may be turned out in a paddock.

Patella.—Fracture of this bone follows severe muscular contraction or external violence. Owing to its lack of rigidity, it is fortunate that it is rarely seen in practice. The position is a very difficult one to fix, and plasters alone do not, as a rule, stay on a sufficient length of time and require renewing. If the fracture is horizontal or perpendicular and the patient valuable, cutting down on the bone and wiring may be worth trying; but it must be remembered the stifle-joint is large and complicated, and septic infection, both operative and post-operative, is easily possible. In a case the writer had some years ago in a cart-mare, partial immobilization of the joint was secured by inserting four button sutures in front of the patella, thereby drawing the skin into a perpendicular ridge of about an inch in height. Part of the skin sloughed, leaving a granulating wound, which cicatrized in due course. The bone united, but although several blisters were later applied, the mare never became quite sound. She was able, however, to do odd farm work, and bred a foal.

Radius.—If this bone is broken at the lower third, simple and non-comminuted, and the animal is moderately young, setting may be attempted with a fair prospect of good results. Where the fracture is high up and the ulna fractured as well, immobilization is difficult to obtain and recovery more remote. In the case of the horse slinging is essential. A thin layer of pitch plaster is pasted on to the skin from the knee up to, and above, the elbow, and over this is wound, while hot, a stout calico bandage soaked in silicate of potash. Several silicate of potash bandages are then firmly applied. Considerable support is given by carrying a stout thick bandage, fixed on the broken limb, over the withers, and wound round the forearm of the sound opposite leg, bringing it again over the withers and suturing it to the bandage which binds the broken leg. Cattle take care of their broken legs fairly well, which is very fortunate, as in their case slinging is impracticable. Dogs and cats are treated in a similar manner, except that a *soft* bandage is carried down from the knee to the foot to prevent circulatory strangulation. The bandage must be soft to allow slight movement, which, as has already been pointed out, is conducive to a good recovery (see General Remarks). In setting this bone, as in all other fractures, it is scarcely necessary to emphasize the necessity of making sure that the normal position of the limb is secured at the outset and maintained throughout the setting process, and, further, that the ends of the bones are brought into their proper position and retained there. If the fracture extends into the radio-humeral or radio-carpal joints, particularly in the horse, treatment should not be attempted.

Ribs.—If the fracture is simple, and no injury has taken place to the parietal or visceral pleura or lungs, Nature generally effects a cure unaided. In small animals a pitch plaster applied over the injured area, and the chest wall carefully bound, will be found the most satisfactory treatment. If the fracture is compound and comminuted, all broken pieces of bone must be removed and the wound carefully dressed with tincture of iodine tampons, but on no account must it be irrigated, owing to the danger of fluid reaching the chest cavity. Needless to add, free drainage must be arranged for by laying open cutaneous, subcutaneous, and muscular pockets. The cavity is then packed daily with carbolized lint soaked in tincture of iodine or iodo-benzine, and the chest wall bandaged, a window being made opposite the wound so that daily dressing may be carried out.

Sacrum.—Where no spinal complications exist, or if only to a very slight degree, treatment may be adopted. In the horse slinging is essential, and both in the horse and ox a pitch plaster charge is applied, provided *no injury to the skin has taken place*, which is, however, very uncommon, for the violence sufficient to cause fracture generally damages the skin too. If the skin is injured, although no abrasion may be visible, it is bad surgery to employ an emplastrum, for the obvious reason that pus is almost certain to form, as it will be imprisoned by the plaster, with consequent fatal burrowing. If the fracture is compound, owing to the difficulty, or rather the impossibility, of free drainage, the wound should be painted twice daily with tincture of iodine and plugged with absorbent gauze smeared with B.I.P.P. In the dog and cat absolute rest is essential, and provided no untoward symptoms set in, recovery may be anticipated.

Scapula.—Fracture may take place in the spine, the body, the neck, or into the articular cavity. If the spine is broken and simple, no treatment is called for. When compound and comminuted, the broken pieces are removed and the wound irrigated with antiseptics daily. If the body is fractured, simple, and not displaced, slinging in the case of the horse is essential, and a pitch plaster must be applied. Where displacement is pronounced, and especially if the fracture is compound, the writer has obtained excellent results by enlarging the wound perpendicularly, laying bare a corresponding part of the scapula, trephining the bone, and wiring it. This is most easily performed in the case of light-legged horses and cattle, where the supra- and infra-spinatus muscles are not so fleshy. It may be necessary to insert a wire suture in both scapular grooves, but one may be attempted first, and if it fails, then the other must be operated on in like manner. Slinging, of course, is essential. In the ox complete union is not so necessary, and here a simple pitch plaster and bandage may be applied to the affected shoulder. In these animals, where displacement is evident, it must be reduced by traction, the operator pulling the limb from the body, whilst an attendant fixes the trunk and at the same time presses downwards and inwards upon the scapula. While in this position the whole scapular area is plastered, the animal not being permitted to move until the dressing has become completely hard. In the case of fracture of the neck, the same principles are applied. Where the fracture extends into the joint in the case of the horse, treatment should not be attempted, but in cattle plastering and bandaging and fattening for the butcher is a sound economic procedure.

Pelvis—1. *Coxal Tuber of the Ilium.*—In many cases no treatment is required. If the patient is a horse or an ox, the quarter will present a dropped appearance, and there may be a local swelling for a short time. Where the fractured bone has become completely isolated, and particularly in the case of compound fracture, necrosis may set in, in which case the pieces must be removed and the cavity treated as an ordinary wound.

2. *Shaft of the Ilium.*—If this bone is fractured but not displaced, a favourable prognosis may sometimes be given. In the case of the horse he should be slung, and the whole quarter and back thickly coated with pitch plaster compound. In cattle a similar procedure may be adopted, but without slinging.

3. *Acetabulum.*—In the larger animals treatment is nearly always unsatisfactory, and should not be lightly entered upon. In the dog and cat, however, by immobilizing the quarter with plasters and bandages, a fair recovery may sometimes be looked for.

4. *Symphysis.*—Fracture in this region is nearly always fatal, for superadded to the gravity of such fractures it must be remembered that the initial cause to bring about the condition exerts a grave straining influence upon the adjacent parts; consequently the patient is invariably unable to stand, particularly in the case of young cows advanced in pregnancy. As a rule, therefore, the soundest economy is to order the animal's destruction.

Tibia.—In young horses, if the fracture is simple with no displacement, and situated at the lower third of the bone, treatment may be attempted. Place the patient in slings, apply a pitch plaster from the hock up to the pelvis, and over this, while hot, very stout calico or sacking. Several silicate of potash bandages are next applied, beginning at the hock and extending as high up the quarter as possible. The bandage is then carried over the back to embrace the opposite leg, bringing it back and suturing the end to the bandage material round the fractured limb. In cattle the same treatment, with the exception of slinging, may be carried out with impunity, and also in the case of the dog and cat, but in these latter animals, for reasons already explained, a soft bandage must be applied from the hock to the foot also. Compound fractures in the larger animals are hardly worth treating, but in the smaller patients there is sometimes the reward of a good recovery, due to the adoption of immobilization and antiseptic surgery.

GALL-BLADDER, INFLAMMATION OF.

In practice there is no diagnostic symptom of cholecystitis, nevertheless certain data are often present which will arouse the practitioner's suspicion. Inflammation of the bladder primarily seldom exists in animals, the duct being usually implicated, so far as the writer's experience shows in post-mortems on cattle and dogs. In cattle a full dose of sodium sulphate is given at the outset, and for the dog ½ to 1 grain of calomel, followed by repeated doses of acetyl salicylic acid, 4 drams for cattle and 10 to 15 grains for dogs, three times daily. Chloride of ammonia in alternate doses is useful in similar quantities, or the following may be tried:

For the ox :

℞ Sodii Salicylatis	ʒii.
Sodii Hyposulphatis Potassii Bicarbonatis	āā ℥i.

M. Ft. pulv. One to be given three times a day in barley gruel.

For the dog :

℞ Hydrargyri cum Cretæ	grs. ii.
Sodii Bicarbonatis	grs. v.

M. Ft. pulv. One to be given three times daily in a little milk or on the tongue.

GALLS (COLLAR AND SADDLE).

Collar Galls are largely due to badly fitting collars, and they are also seen in over-worked, under-fed, and out-of-condition horses, particularly in young animals. Again, horses with tender skins are predisposed to galls. Before adopting treatment it is therefore obvious that one must ascertain what cause or causes are in existence. If the horse is out of condition, a course of better food, rest, and tonics is the treatment indicated. The shoulders, immediately after removal of the collar, must be bathed with hot water to which is added a little common salt, and an astringent lotion afterwards applied:

℞ Acidi Sulphurici	ʒi.
Aluminis	℥i.
Aquæ	ad O.ii.

M. Ft. lotio. To be applied twice daily.

Or—

℞ Plumbi Acetatis	℥i.
Zinci Sulphatis	ʒvi.
Tincturæ Arnicæ	℥i.
Aquæ	q.s. ad ℥xx.

M. Ft. lotio. To be applied twice daily.

The horse should not be put to work too soon, but a breast collar properly padded may be used earlier than an ordinary collar. When the gall is situated at the top of the withers, the writer has often found good results follow the insertion in the "housing" of a properly fitting zinc plate. Where a circumscribed necrosis takes place, immediate dissection to separate the dead from the living is called for, the subsequent treatment being that of an ordinary wound. Where the horse is very fat and out of condition and perspires freely, the perspiration with the friction of the collar acts as a cutaneous irritant. In such cases it is advisable to clip the hair, and after work wash the skin with weak salt and soda-water solution, and then apply an astringent lotion. In troublesome cases a strong biniodide of mercury blister to which is added 10 minims of sulphuric acid to the ounce, well rubbed into the collar area, and the patient given a good rest, acts as an excellent preventive of collar galls. Where collar tumours exist in addition to a gall, they should be excised (see Botryomycosis).

Saddle Galls.—At the beginning of the hunting season these are often very troublesome, both to practitioners and owners. Here also the fact of an animal being out of condition is a predisposing cause. Some horses have very tender skins, and gall on the slightest provocation. This is particularly noticeable in hunts in hilly districts. The horse, however, is not always at fault, for some riders will gall every horse they mount, whilst others do not. The man who rides as a dead weight is very severe on his horse's back and skin. Again, riders who carry their seat well back gall the skin covering the lumbar muscles at the posterior third of the saddle seat, for here there is a certain amount of lateral motion, and, given undue pressure, the friction set up soon creates a gall. On the other hand, those riders who sit well forward, particularly if the withers are high, are liable to gall those parts. In these cases a well-fitting numnah is often beneficial. When a horse arrives at the stable with a galled back, the saddle should be removed, the pad washed clean and dried, while the skin is bathed with hot water and salt, and an astringent lotion applied. The saddle is then strapped on lightly and left for an hour or two. In galls presenting deep-seated injury, necrosis is almost sure to follow, and excision as in collar galls is advised. The part should then be dressed and covered with cotton-wool. Where there is much suppuration, a window may be made in the horse-rug to facilitate easier drainage, etc. If there is evidence of fistulous withers, the treatment laid down for this condition must be carried out. In horses with tender skins the same applies to galled backs as to galled shoulders, and the writer has found much benefit derived from blistering the skin of the back. It is unnecessary to add, it is the first consideration of the practitioner to see that the saddle is not at fault in the padding or that in high-withered shoulders the arch does not press upon those parts.

GALL-SICKNESS (GALZIEKTE).

An appellation used indiscriminately by the South African farmer to denote any form of cattle sickness in which an icteric condition of the visible mucous membranes exists. Several distinct specific diseases, as well as the simple idiopathic disorders, are alike diagnosed as "gall-sickness" upon no other ground than the jaundiced appearance of the eye and buccal membrane, or even upon grounds of a disordered or irregular state of the bowels.

Several scientific investigators have endeavoured to classify and define these varying disease conditions, but the chief work in this respect has been accomplished by Theiler of the Transvaal, who was able to show the presence of a minute organism in the red corpuscle of the animal affected with typical gall-sickness, and who termed the affection "anaplasmosis" (from the absence of cytoplasm in the structure of the organism).

Spread by the blue tick (*Rhipicephalus decoloratus*)—responsible for the disease Texas fever—the pathological picture presented by gall-sickness is similar to the chronic or cachectic form of Texas fever observed in America in the autumn of the year, and in other ways the association of the two diseases is a close one.

The losses from gall-sickness proper, as thus defined, are not great amongst indigenous animals, unless upon transfer from high and comparatively tick-free areas to low and grossly tick-infested veldt. The loss amongst imported stock coming from tick-free countries, however, is great, and as the vector of the disease—the blue tick—is common to both Texas fever and gall-sickness, the two diseases are often found running intercurrently, or closely following each other, in the same animal host, such double infection naturally increasing greatly the percentage of loss.

As a wasting blood disease, reducing the erythrocyte count and producing marked anæmia and icterus with enlarged spleen and catarrh of the intestinal tract, the prognosis in the acute case is a grave one, and remedial measures are of small avail.

Intravenous injections of normal saline solution have been attended with success, as have also the use of the aniline dye trypanroth in 1½ per cent. solution, administering about 150 c.c. subcutaneously. Hæmatinics and arsenic are indicated to counteract the altered blood conditions, and careful nursing is necessary during the acute phase of the disease, and a very liberal diet during the subsequent prolonged chronic stage.

As in other tick-borne maladies, the real remedy for the disease is prophylaxis, and it is in the systematic destruction of the tick that the best form of treatment lies for gall-sickness, as for so many other of the South African stock disorders (see Ticks, Control of).—*H. Watkins Pitchford.*

GALL STONES. *See* Calculi.

GANGRENE.

For the general principle of treatment gangrene, as met with in practice, is divided into dry, moist, and traumatic gangrene.

Dry Gangrene is seen in those conditions where the arterial flow of blood is checked, a good example of which is seen in a case of severe pressure caused by badly fitting saddles completely cutting off the arterial blood-supply and setting up cutaneous and subcutaneous mummification. This process may, and often does, proceed without septic changes developing, and if left to Nature, in the course of time the underlying granulating tissue throws off the dead material, leaving a healthy wound. In such cases surgical removal of the mummified tissue hastens recovery. Occasionally one meets with a case of dry gangrene in the extremities, particularly in the smaller animals, and here amputation is usually called for.

Moist Gangrene is seen where the return of the blood and lymph fluids are thwarted, the tissues being saturated with effused material, the presence of which facilitates the development of septic processes. A bandage applied to the limb and left *in situ* for a considerable time in such a way as to cause circulatory strangulation will produce moist gangrene. Bier's treatment, if unskilfully carried out, will cause moist gangrene. The first consideration here is to reduce the risk of septic infection by placing the diseased limb in a warm antiseptic bath containing a solution of salt, after which it is bound with carbolized wool and lightly bandaged, the bathing being repeated several times daily. Other typical cases of moist gangrene are to be found in the udder and the lungs following acute infectious inflammation. For the treatment of these, see their respective diseases.

Traumatic Gangrene,* as is well known, is highly fatal, and follows upon an abrasion admitting such septic organisms as the malignant œdema bacillus and other gas-producing organisms. As these latter organisms are anaerobic, traumatic gangrene is most commonly seen in a deep punctured wound in the region of the larger muscles; and the first consideration here is to lay the wound open and repeatedly irrigate it with solutions of permanganate of potash, peroxide of hydrogen, oxygen water, etc. The strength of the patient must be maintained throughout and diffusible stimulants administered—brandy, spirits of ammonia, and strong coffee, subcutaneous injections of strychnine and caffeine, and the intravenous injections of normal saline solution. It may be added, however, that unless the practitioner is called in the early stages, treatment invariably proves futile.

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* Burroughs and Wellcome prepare an anti-gas gangrene serum of high potency and immunizing properties derived from *B. œdematicus*, *V. septique*, and *B. Welchii.*

GARGET. *See* **Mastitis.**

GASTRECTASIS.

Gastrectasis is largely due to gastric atony consequent upon the prolonged ingestion of bulky innutritious food. It is not uncommonly seen in young growing colts grazing on poor upland pastures. It is also met with in young calves which are hand reared. The medicinal treatment is similar to that prescribed for atonic indigestion (which see). The diet must be concentrated, light, nutritious, and digestible. For the horse, bran, oats, best hay chaff, and occasionally a little well-steamed hay. Calves should be fed often, the food given in very small quantities, milk being well diluted with calf meal gruel and boiled linseed. The digestibility of the milk is greatly increased by the addition of a little bicarbonate of soda.

GASTRIC CATARRH. *See* **Dyspepsia.**

GASTRIC IMPACTION.

Gastric impaction occurs most frequently in the horse, ox, sheep, pig, and only very occasionally in the dog. Where the food is of a hard, dry, indigestible character, and the cause of a cumulative nature, great difficulty is encountered by the practitioner in effecting its removal. Tympanites may or may not be an added complication. In cattle the rumen is the usual organ implicated. In affected animals, more or less complete paralysis of the stomach wall takes place, both motory and secretory. The object, therefore, is to stimulate the neuro-muscular elements of the stomach by the hypodermic injection of full doses of strychnine and pilocarpine. The former stimulates the nervous and the latter the secretory elements.

For horses and cattle :

℞	Strychninæ Hydrochloratis	gr. i.
	Pilocarpinæ Nitras	grs. ii.
	Aquæ	ʒi.

M. Ft. injectio. Repeat if necessary every five or six hours.

And the following is given *per oram :*

℞ Spiritus Ammoniæ Aromaticus Ticturæ Zingiberis	āā ℥i.
Olei Lini	O.i.

M. Ft. haust. To be repeated in two or three hours, if necessary substituting linseed tea for the linseed oil.

For sheep one-quarter the above doses should be given.

Drinking water should be allowed *ad lib.*, and if the patient does not take enough, he should have 2 tablespoonfuls of common salt thrown on the tongue twice daily. In the case of the dog an emetic is advised—ipecacuanha wine *per oram* or a hypodermic injection of apomorphine, $\frac{1}{20}$ to $\frac{1}{5}$ grain. All food should be withheld, but water may be allowed *ad lib.* and the following administered:

℞ Bismuthi Carbonatis Sodii Bicarbonatis Sodii Sulphatis	āā grs. v.

M. Ft. pulv. One three times a day in a tablespoonful of senna tea.

Double the above dosage may be given to a full-sized pig, but, of course, salt must be excluded from the régime.

GASTRIC TYMPANY.

Gastric tympany in the horse is as a rule a serious condition, owing to the limited capacity and situation of the stomach. The combination of drugs the writer has found most useful in these cases is the following:

℞ Aquæ Ammoniæ Fort.	ʒi.
Chlorali Hydrati Tincturæ Camphoræ Co.	āā ℥i.
Olei Lini	O.i.

M. Ft. haust. To be repeated every three hours until relieved, the linseed oil being replaced after the first dose by linseed gruel.

Needless to add, the patient must be kept from rolling.

Reeks recommends the following:

℞ Ferri Sulphatis	℥i.
Aquæ Ammoniæ Fort.	ʒiv.
Aquæ Ferri	O.ii.

M. Ft. haust. To be given at once; and if relief is not obtained, 1 to 2 ounce doses of turpentine should be given.

More recently the use of the stomach tube has been advocated (see Stomach Pump). In cattle the rumen is the stomach which becomes tympanitic, and this is very common in bovine practice. If the distension is only slight, 1 pint to 1½ pints of linseed oil and 1 dram of carbolic acid or 1 ounce of Sanitas will often give relief, followed by stomachics. In these tympanitic conditions the writer has discarded turpentine, finding its value much overrated in cattle practice. A useful stomachic is the following:

℞ Ammonii Carbonatis	℥ss.
Sodii Bicarbonatis	℥i.
Pulveris Zingiberis	ʒii.
Sodii Chloratis	℥i.ss.

M. Ft. pulv. One to be given night and morning in a quart of well-boiled flax gruel and ½ pound of treacle.

When the tympany becomes excessive, tapping with a wide-calibre trocar and canula is indicated. The seat of puncture is, of course, on the left side, equidistant between the posterior border of the last rib, the transverse processes of the lumbar vertebræ, and the angle of the ilium—in short, at the most prominent point. The patient is nosed and horned by an attendant, and the instrument is thrust into the rumen in an almost perpendicular direction and the trocar withdrawn. It may be advisable to allow the canula to remain for an hour or two, and in some cases for several days. It is not unusual to find it necessary to re-tap several times, and it is better to choose a different site each time. In these cases it is good practice to inject antiseptic solutions direct into the stomach through the canula—such antizymotics as boric acid, 2 drams; carbolic acid, 1 dram in oil; eucalyptus, 4 drams; or chloral hydrate, 8 drams. Exercising the patient tends to check and prevent the accumulation of gas. In both horses and cattle all foods tending to gas formation, such as roots, succulent grasses, etc., must be withheld, and a concentrated diet, light, dry, and digestible, ordered.

GASTRITIS.

Gastritis, existing as a primary condition, may be seen following acute catarrh, but more often it is symptomatic of certain secondary specific diseases, or it may follow the direct effect of irritant poisons. In any case, the first consideration is to place the stomach in as complete a state of rest as possible by withholding food and allowing ice water only to drink, maintaining the strength with nutrient enemas, such as beaten eggs, milk, gruels, a 2 per cent. solution of glucose or albumen water, etc., and carrying out gastric lavage by means of the stomach pump, using a warm solution of bicarbonate of soda, 1 dram to the quart. Medicinally the horse and ox should have the following:

℞	Acidi Borici Bismuthi Carbonatis	ää ʒi.
	Sodii Bicarbonatis	℥i.
	Olei Lini Liquoris Calcis	ää ℥ii.

M. Ft. haust. To be given every four or five hours in a pint of flax gruel.

For the dog :

℞	Acidi Borici Bismuthi Carbonatis	ää grs. v.
	Sodii Bicarbonatis	grs. vi.
	Mucilaginis Tragacanthæ	♏x.
	Aquæ	q.s. ad ʒi.

M. Ft. haust. One teaspoonful to be given every five hours.

Where there is indication of great pain, hypodermic injections of atropine and morphia should be given, but sedatives *per oram* are wisely withheld.

When the acute stage is reduced, an acid tonic mixture is prescribed.

For horses and cattle :

℞	Acidi Nitrohydrochlorici Dil.	ʒi.
	Tincturæ Nucis Vomicæ	℥ss.
	Aquæ	ad ℥i.

M. Ft. haust. To be given in a pint of barley gruel night and morning.

For the dog :

℞	Acidi Nitrohydrochlorici Dil.	♏vii.
	Tincturæ Nucis Vomicæ	♏v.
	Succus Taraxaci	ʒi.
	Aquæ	ʒi.

M. Ft. haust. To be given in a tablespoonful of linseed or starch gruel three times daily after meals.

When the gastritis is traceable to the direct action of poison in animals that vomit, emetics should be given and suitable antidotes administered.

GASTRO-ENTERITIS.

Gastro-enteritis in all animals is a highly fatal disease, and in high conditioned, full-blooded cart-horses and stallions it is very rapidly fatal. Whether the condition begins as a simple catarrh, or is a sequel to irritation set up by parasites, vegetable or mineral piosons, aggressive bacteria and their toxins soon enter the field, and, what is of more importance from a therapeutic point of view, they hold complete sway. It is therefore against their rapid growth and their products that the practitioner has to fight. In severe cases, however, therapy is usually futile. In the less acute forms treatment may be successful. If the animal is in much pain, and the pulse full and bounding, bleeding should be resorted to, followed by the subcutaneous injection of a gallon of normal saline solution. This procedure will at least tend to relieve the overcharged blood of the excess of toxins, and auto-intoxication is a condition to be greatly feared.

The following, for horses, may be administered:

℞ β-Naphthalini Acidi Borici	āā ʒi.
Chlorali Hydratis	℥ss.
Liquoris Calcis Olei Lini	āā ℥i.

M. Ft. haust. To be given in a pint of flax gruel every three or four hours.

If the animal evinces much pain, hypodermic injections of atropine and morphia are advised, followed by 1-dram doses each of tincture of aconite, B.P., and extract of belladonna may also be given. Where poisons are in evidence, the antidotes must be administered at the earliest possible moment; and if parasites are present, their elimination is called for, but this must not be by drastic measures. In the case of the dog gastro-enteritis tends to run a less rapid course. A dose of medicinal paraffin, ½ to 1 ounce, is given at the outset, followed by—

℞ β-Naphthalini Bismuthi Carbonatis	āā grs. v.
Sodii Bicarbonatis Sodii Sulphatis	āā grs. x.

M. Ft. pulv. One to be given every five hours in tragacanth mucilage.

Diet is an important factor, and it is essential the patient should have no solid food during the acute stage, but the strength must be maintained solely on nutritious gruels, and, in the case of the dog, peptonized milk, or Glaxo, or albumen water.

GASTROPHILUS EQUI.

Bots in the horse's stomach are most difficult to displace by therapeutical measures. The only agent which gives the writer any satisfaction is bisulphide of carbon. Overnight the patient is given 4 ounces each of sodium sulphate and sodium chlorate, and all food withheld.

The following morning he is allowed a gallon of water to flush the stomach, and an hour later he receives a capsule containing 3 to 4 drams of bisulphide of carbon.

On the two succeeding mornings he receives the maximum dose in capsule.

Subsequent treatment consists of giving a gallon of new milk every morning, either voluntarily or as a drench, for a week or ten days. (See also Parasitic Diseases.)

GASTROSTAXIS.

This condition is not very common in the lower animals, but the writer has met with examples in the dog and pig. If the attack is severe, all food must be withheld for a few days and ice water only allowed, the patient's strength being maintained by nutrient enemas, and the following mixture prescribed:

For the dog:

℞ Bismuthi Carbonatis }
Ferri Carbonatis Saccharati } .. .. āā grs. x.
Sodii Bicarbonatis .. .. grs. xx.
M. Ft. pulv. One to be given three times a day for two or three days.

After which the following is substituted:

℞ Ferri Sulphatis .. .. grs. iv.
Acidi Sulphurici Arom. Dil. .. .. ♏x.
Aquæ .. .. q.s. ad ʒii.
M. Ft. haust. Two teaspoonfuls to be given night and morning after food.

One and a half the above doses are suitable for the pig.

GATHERED NAILS.

Injuries to the sensitive structures of the foot must always be looked upon with suspicion, for invariably picked-up nails are not taken in hand in the early stages, the practitioner only being called in when irreparable damage has been done, and grave symptoms have become established. If the nail is *in situ*, immediate removal is a *sine qua non.* The hoof should then be pared away around the injured part, the wound enlarged, and the cavity carefully curetted with a fine curette, after which it is packed with boric acid. The foot should now be placed in a warm bran or linseed poultice to which is added a handful of common salt and a wineglass of such antiseptics as Lysol or Jeyes' Fluid, this treatment being carried out for seven or ten days. Where the pain and lameness is intense, or where the articular joint and flexor pedis perforans are involved, in addition to the above treatment, the writer has obtained excellent results by placing the foot and limb in a brine (hot) bath and applying *Bier's treatment* (which see). When the injury has sufficiently healed, the sole is packed with tar and tow, a leather sole applied, and exercise ordered.

If the lameness persists, a strong blister applied round the coronet, and repeated if necessary, hastens resolution. When one is dealing with a valuable animal, the possibility of tetanus should not be overlooked, and the injection of antitetanic serum as a prophylactic considered advisable. When bacterial invasion is much in evidence vaccine therapy is worthy of a trial.

GILLAR (PARASITIC ANÆMIA).

The term is used in Northern India, and means swollen throat (bottleneck). The symptoms are due to parasitic infection. Having ascertained by post-mortem examination the nature of the causal parasite (helminth), the necessary therapeutic and preventive measures may be adopted.—*G. K. Walker.*

GLANDERS.

Prophylaxis is the only measure requiring consideration here, and as this disease is a scheduled one, suspicious or affected cases require immediate notification. The judicious application of the mallein test has in this and other countries been a most successful agent in checking, and in some instances freeing the community of, this insidious equine scourge. To the everlasting credit of the Royal Army Veterinary Service, after the Great European War, when the movement of animals from the war zone took place into this country on an enormous scale, thanks to the mallein test, we have remained comparatively immune. The writer, being in charge of the Somerset Mule Depots, and having tested many thousands of mules, had ample opportunities of observing the test, and he came to the conclusion that, compared with the horse, the reaction in the mule was more erratic and less reliable on the whole, the thermic reaction often coming on more quickly and being of shorter duration. On the whole, the conjunctival and intra-dermo-palpebral test gave the best results. (See also Mallein test.)

GLAUCOMA.

Glaucoma is occasionally seen in the lower animals, and as it is a troublesome condition to get rid of, the eye is left usually severely alone. The condition is due to the excessive accumulation of intra-ocular fluids, which normally should pass through the pupil into the anterior chamber, and thence into the ciliary canal.

If treatment is decided upon—(1) A course of myotics to relieve tension may be tried, the principal of which are physostigmine, 1 per cent. ointment, and the application of leeches; (2) or a 1½ per cent. solution of pilocarpine nitrate may be tried; (3) the eye may be tapped and the fluid evacuated from the anterior chamber, but this measure is generally only temporary, as a reaccumulation invariably follows; (4) iridectomy may be performed, but as this is a very delicate operation and outside the province of this work, the reader is referred to ophthalmic textbooks for details.

GLOSSITIS.

Inflammation of the tongue is seen in all animals, usually the result of irritants, sometimes from the effects of foreign bodies, and occasionally as a sequel to specific diseases such as actinomycosis. The animal should have an aperient at the outset and all sources of irritation removed, while in the case of rugged teeth rasping is indicated.

The mouth should be irrigated with normal saline solution to which is added weak permanganate of potash, boric acid, or peroxide of hydrogen. The irrigation should be carried out several times a day, and the best means of doing so is by inserting the nozzle of an ordinary human enema syringe and squirting the fluid in with considerable force.

Naturally, the animal should be placed on a liquid or semi-liquid diet until convalescence sets in. Where the disease takes on a chronic form with consequent induration, painting daily with tincture of iodine and administering potassium iodide or biniodide of mercury is advised. Where the disease is of actinomycotic origin, treatment for that condition is indicated.

GLOSSOPLEGIA.

This disease is fortunately not very common. It is due to injury of the hypoglossal nerve, or it may appear as a complication in certain affections of the brain involving the centre from which the nerve springs. Treatment as a rule is in either case generally useless, and particularly in the case of cattle slaughter is advised. If treatment is, however, decided upon, the reader is referred to paralysis of nerves (which see).

GOITRE.

This condition is most commonly seen in the dog, and occasionally in the horse and calf. Some districts are more prone to the disease than others. Where the parenchymatous form exists, a smart biniodide of mercury blister should be applied, and the patient placed on a course of thyroid extract and potassium iodide. In the cystic form the fluid should be aspirated, and equal parts of tincture of iodine and glycerine injected, the operation being repeated every week until resolution sets in. In all cases a purgative is advised at the outset—aloin and calomel in the horse, hydrargyrum c. creta in the dog, salines in the calf.

Where danger of suffocation exists, an operation is imperative. This consists of resection of a portion of the isthmus on either side of the middle line under sterile precautions, or the whole isthmus may be removed. In obstinate cases which defy the above treatment, a prominent portion of the lobe should be cut into and a piece removed, taking care not to injure underlying bloodvessels and nerves.

In suitable cases autogenous vaccination—*B. coli* vaccine—may give good results, and a course of intestinal antiseptics administered, such as thymol, β-naphtha, bismuth, soda hyposulphate.

Where malignant complications exist, treatment is useless.

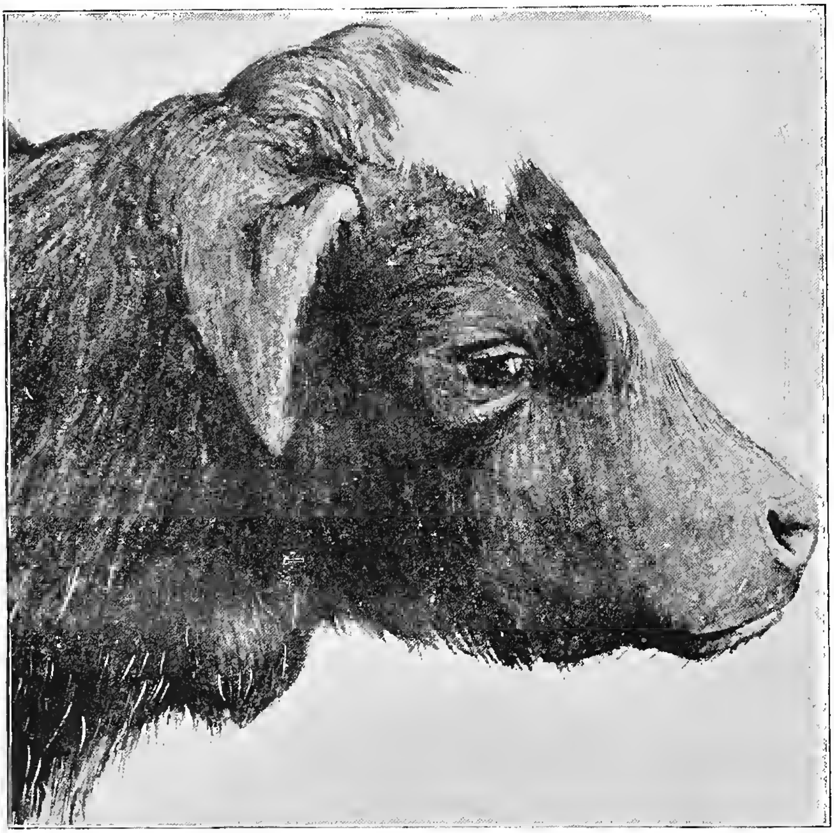

FIG. 75.—CALF, SHOWING ENLARGED THYROID GLAND.
(From Moussu and Dollar.)

GONITIS.

Inflammation of the stifle-joint is seen most commonly in the horse and ox. It may be due to complicated strangles, influenza, joint evil in young colts, or in cattle to rheumatism, and in all animals to direct or indirect injuries.

In the early stages a purgative is indicated, and local hot fomentations and cooling lotions applied. Where the condition is subacute or chronic, blisters and rest or the actual cautery are advised. Where capsular distension is in evidence, aspirating and immediate blistering is called for. If the lameness defies the above treatment, setons may be tried, these being dressed with oil of turpentine cum oil of cantharides.

If the condition is due to an injury and the joint has become septic, prognosis is by no means hopeful. Where treatment is decided upon, the articular cavity should be irrigated with proflavine, boric acid, citric acid, and oil of caryophylla mixed with medicinal paraffin. This should be injected at least twice daily, and where it can be arranged, a hose-pipe should be fixed to the joint, and the water irrigation continued night and day until the flow from the wound has ceased, or continuous irrigation with hypochlorite solution may be tried as carried out in poll-evil. The subsequent lameness may be counteracted by repeated blistering, firing, or setoning.

Where the joint is sterile when the practitioner sees the case, he will obviously use all his skill in maintaining this condition by adopting antiseptic measures.

GREASE.

Old-standing cases of grease are most troublesome to treat, especially in old phlegmatic, gross constitutioned horses with hairy legs. The shire horse, therefore, is probably the most common victim. The animal should have a full dose of physic, followed by a course of arsenic, sodium hyposulphate, and sodium chloride. Locally the hair should be removed, and the leg or legs washed with hot water, soda and soap, and dried thoroughly. The dressings advocated by various practitioners are legion, such as the coal-tar preparations, zinc salts, mercurial salts, etc.

After an extended trial of most of them, the preparation which has given the writer the most uniform results is liquor ferri perchloridi fort. This is gently rubbed into the affected area by means of a piece of tow wound round a stick. The dressing should be applied every three or four days at first, and later on once a week. Should this treatment after a time in very obstinate cases seem to lose its effect, the following drying powder is rubbed in with the hand daily for a week, after which the iron treatment is again continued—*i.e.*, equal parts of boric acid, powdered lime, and common salt.

Where, as the result of the irritating effect of the disease, a proliferating dermatitis (grapes) has become established, these should be burned off with the hot iron and antiseptic emollients applied.

In all cases of grease it is most essential the limb should be kept as dry as possible. The writer has obtained good results in obstinate cases from auto-vaccination, and where local treatment fails this additional course is advocated.

GUT TIE. *See* **Hernia.**

GUTTURAL POUCH, DISEASE OF.

The most common condition affecting the guttural pouches in equines is catarrh of the mucosæ as a sequel to influenza, strangles, pharyngitis, and as these conditions clear up, so also as a rule does the guttural mucous membrane. Occasionally one finds in practice, however, as a result of a severe mucositis, an excessive accumulation of pus takes place, bulging the pouch or pouches and accounting for the intermittent nasal discharge, swelling of the parotidean region, and consequent interference of respiration.

If the case is seen in the early stages, feeding the patient from the ground, to facilitate drainage of the pouch, and a course of tonics prescribed may bring about recovery. If this fails, other palliative measures are usually useless, and radical surgery is called for.

The following is the method excellently described by Dollar in his "Regional Surgery and Operative Technique": "The patient is cast and chloroformed, and if symptoms of dyspnœa take place, a tracheotomy tube should be inserted. The skin over the parotid is shaved and sterilized, and an incision made, 2 to 4 inches long, in front of the anterior border of the wing of the atlas and parallel with it. The posterior border of the parotid is gently raised, pushed forward, and between the long horn of the hyoid bone in front and the styloid process of the occipital behind, the subparotidean fascia is cut through, bringing into view the occipito-hyoideus and digastricus muscles. The two fore-fingers dilacerate the connective tissue, and the angular space (occupied by the occipito-hyoideus) between the styloid of the occipital and the hyoid cornu is discovered. At the centre of this space a straight bistoury, with its cutting edge turned towards the hyoid bone, is passed obliquely downwards and forwards through the muscle into the guttural pouch. The knife, having just penetrated the pouch, is withdrawn, and the puncture is then enlarged by a sharp thrust of the index finger. If the knife is directed towards the ear or atlas, it may wound the facial nerve, posterior auricular artery, internal carotid, or the nerves that accompany it; if towards the larynx, the hypoglossal nerve and external carotid artery will be endangered. Deep puncture is also dangerous, for if the lancet is implanted perpendicularly, it may reach the internal carotid artery, vagus, and accessory spinal nerves. To effect drainage a counter-opening is necessary in the position of Viborg's triangle. For this purpose Dieterich employed a curved trocar, but the operation may be more easily carried out with an **S**-shaped probe or curved blunt seton needle

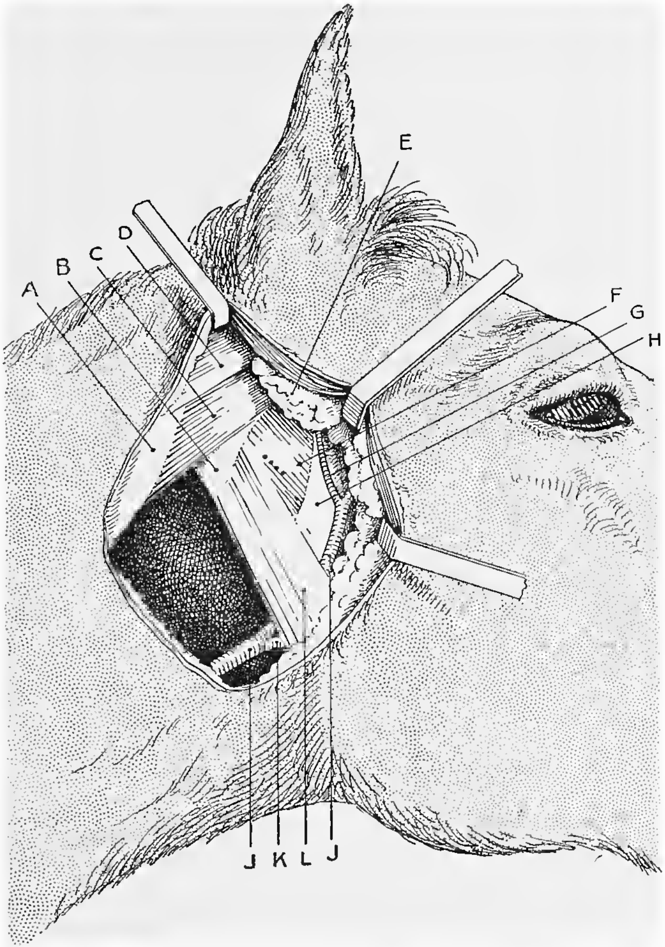

Fig. 76.—Deep-Seated Structures of the Parotid Region and the Seat of Operation on the Guttural Pouch. (Dollar's "Regional Surgery.")

A, Atlas; *B*, styloid process of occipital; *C*, obliquus capitis superior; *D*, tendon of the complexus and rectus capitis posticus major; *E*, parotid gland; *F*, occipito-hyoideus muscle; *G*, post-auricular artery; *H*, hyoid bone; *J*, *J*, external carotid artery; *K*, submaxillary artery; *L*, digastricus. The stylo-maxillaris forms the posterior portion of this muscular mass.

The dotted line indicates the point where the occipito-hyoideus is usually punctured.

(Note.—This excellent diagram is only intended to show the relative position of important elements, so that the operator may be in a better position to evade them when operating on the pouch.—Editor.)

passed through the operation wound into the pouch and directed towards the triangle, the counter-opening being made over the point of the probe, through which a drainage tube or tape is drawn and fixed." Subsequent treatment consists of daily irrigating the cavity with normal saline solution to which is added boroglycerine, proflavine, or a weak solution of sulphate of zinc. Care must be taken not to use too much force in injecting the fluid, owing to the danger of it passing through the Eustachian opening into the pharynx and trachea.

HÆMATEMESIS.

Bloody vomition can only be satisfactorily diagnosed in those animals that vomit. In small animals such as the dog and cat an ice bag placed over the epigastrium is most useful. Some authorities recommend giving iced water as a draught, but the writer questions if this method is of any value. Adrenalin chloride in solution is a most useful drug, and should be given by the mouth as well as hypodermically.

Per oram : For the horse, 2 to 4 drams; for the dog, 10 to 15 minims; for the cat, 3 to 5 minims.

Per subcutis : For the horse, 1 to 2 drams; for the dog, 3 to 6 minims; for the cat, 1 to 2 minims. Ergot or its alkaloid, in the writer's experience, is useless. Normal horse serum is also useful, and should be given an extended trial.

When the severe stage has abated liquor ferri perchloride dil. is a most useful drug. For the horse, 2 drams; for the sheep, 20 minims; for the pig, 15 minims; for the dog, 5 to 10 minims; for the cat, 1 to 3 minims. To be given three or four times a day in a little gruel with beaten egg or eggs. Later the perchloride may be replaced by a course of the sulphate, which should be combined with a little lime water.

Where the hæmorrhage is severe with threatened collapse, the intravenous injection of normal saline solution is called for, or it may be given subcutaneously combined with one-eighth the volume of lime water.

In patients susceptible to gastric hæmorrhage, a course of lime water in the food or drinking water is recommended, thereby increasing the calcium content of the blood. Needless to add, during the attack all food should be withheld, and rectal feeding substituted. When convalescence takes place, sloppy foods should enter into the dietary for the first few days and the animal given an extended rest.

HÆMATOMA.

Serous cysts usually appear most commonly in long-eared dogs, the initial cause being some irritation in the aural canal, with consequent shaking of the head and ear flaps. Lancing the abscess, evacuating the serum, and mopping out the blood-clot sometimes effect a cure. Radical treatment, however, is as a rule necessary, and the best is that advocated by Hobday:

The inner surface of the ear flap is painted with tincture of iodine and a local anæsthetic applied. A longitudinal incision is then made and the cavity thoroughly cleaned out. The two surfaces of the flap, internal and external, are now brought together by close-fitting sutures, after which the whole ear is encased in sterile wadding and a head-cap firmly applied.

The bandage should be removed daily, the flap pressed to remove accumulated fluid, dressed, and rebandaged.

The sutures may be removed in six to ten days, but the head-cap should be retained for some days longer.

HÆMATURIA.

The presence of free blood-cells in the urine may be due to the rupture of bloodvessels in the kidneys, the ureters, the bladder, or the urethra, and, obviously, before treatment can be adopted the practitioner, if possible, must find the source of the hæmorrhage. In those cases of hæmaturia following upon such specific diseases as anthrax, septicæmia, purpura, the discussion of treatment need not be entered into here, as it is of secondary import.

In the renal form the patient should have a brisk purge, followed by the administration of chloride of lime in barley gruel; and in the case of the horse and ox cold packs should be applied to the loins, and in the dog ice bags. Where the bleeding is due to irritant drugs, such as cantharides and turpentine, mustard poultices should be placed over the loins, and copious diluents, such as flax gruel or barley gruel, administered, with moderate doses of opium. In vesical hæmaturia the bladder should be freely irrigated with clean cold water, to free and remove blood-clots, after which adrenalin chloride solution (1 in 5,000) is injected—for the horse and ox, 8 to 10 ounces; for the dog, 1 to 2 ounces; for the cat, 2 to 4 drams. Or a solution of perchloride of iron (1 in 200), nitrate of silver (3 grains to the ounce), chloride of calcium (30 grains to the ounce), or other recognized styptics may be tried. Normal horse serum may also be given a trial.

In urethral hæmorrhages, calculi or injuries are the usual cause, and the removal of the former or the correction of the latter generally overcomes the bleeding.

HÆMOPHILIA.

Constitutional bleeders are not very common in the lower animals. If the hæmorrhage proceeds from a local wound, packing with styptics such as adrenalin (1 in 1,000), perchloride of iron, chloride of calcium, are indicated, and, where possible, bandage pressure may be applied. Where the hæmorrhage is visceral, little can be done except saturating the blood with lime salts—lactate or chloride of lime—and the subcutaneous and rectal injection of normal saline solution. The hypodermic injection of horse serum is also worthy of a trial.

The *injection* of adrenalin is contra-indicated, owing to its effect in raising blood-pressure.

HÆMORRHAGE.

Internal bleeding may occur in all animals and affect all organs. The treatment of this condition will be found under the respective heads. Thus, hæmorrhage from the nose is discussed under *Epistaxis*, the lungs under *Pulmonary Hæmorrhage*, the stomach under *Hæmatemesis*, the urinary tract under *Hæmaturia*, etc.

Where hæmorrhage is **external,** in addition to the constitutional treatment advised in internal bleeding, where the exigencies of the case demand, local concentration is essential.

Where the bleeding takes place from an important vessel, especially an artery, ligaturing is most essential; but before this is done, if the anatomical situation is suitable, a tourniquet should be applied, and should this not be at hand, a bandage is wound round the limb above and over the wound, which is firmly tightened by twisting with a piece of stick passed under it.

Where a number of small vessels are cut, the cavity of the wound may be seared by the actual cautery at a *dull red heat;* or it may be plugged with sterile gauze soaked in tincture of iron, turpentine; or adrenalin or Friar's balsam and spirits of turpentine, equal parts, may be used. The prolonged application of very cold water from a hose-pipe, or hot water at 112° to 114° F., are excellent adjuvants.

In **Post-Operative Hæmorrhages** septic forces are generally at work, in which case the wound must be laid bare, thoroughly irrigated with a mild antiseptic, all infective foci curetted, and the cavity plugged with gauze soaked in turpentine and Friar's balsam.

In all cases of severe *hæmorrhage*, *collapse*, *prostration*, and *anæmia* may follow, and for a description of the respective treatment the reader is referred to the various headings.

HÆMORRHAGIC SEPTICÆMIA.

Due to the specific action of an ovoid bipolar staining bacterium belonging to the so-called fowl cholera group, this disease affects cattle, sheep, swine, poultry, and rabbits; and although its presence is felt more abroad than in this country, the writer is of the opinion that sporadic outbreaks are more common than most practitioners realize, due possibly to the fact that the disease does not attain serious proportions, that it is not accurately diagnosed or carefully investigated, and, finally, that diverse clinical phenomena is the order of events, giving the impression that different diseases exist.

Thus, in cattle there is the generalized form (septic infection), ending in rapid dissolution; the pulmonary form, with acute pneumonic lesions; the intestinal form, with dysenteric phenomena; the subcutaneous form, characterized by œdema of the laryngo-pharyngeal region, the neck, and dewlap.

Whatever phase the disease develops, it must always be remembered that prevention is better than cure; but should curative measures be called for, it is imperative that treatment is undertaken in the early stages; remembering the condition is a very acute *toxæmia*, medicinal therapy bringing small relief. The early *intravenous* injection of an immune serum offers the best curative prospect, and the doses must be large.* Prophylaxis consists in moving the animals to fresh pastures in the case of cattle and sheep, fencing off stagnant pools, top-dressing the land with lime salt or cultivating it; disinfecting the housing accommodation and ground occupied by pigs and poultry, including drains and troughs, and burying or burning all dead animals; separating the healthy from the diseased in the case of all animals, and carefully carrying out vaccination. The writer advises three injections as a prophylactic, the doses to be given once a week—the first and second doses consisting of the killed organisms, while the third is attenuated and *slightly virulent*. On farms where there is a tendency for a yearly recurrence, the animals should be vaccinated before the recurrent period arrives.

Walker advises in India contact animals in actual outbreaks should be inoculated with a preventive serum.

HÆMORRHOIDS.

These are occasionally seen in the dog, but seldom in the horse. The writer has seen two cases in the bull. Constipation, torpidity of the liver, too much rich food, and too little exercise, are the usual contributory causes. In the horse a dose of aloes followed up by salines in the food daily, and in the dog a blue pill and daily small doses of medicinal paraffin or Virolax, are indicated.

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* Where the animal is threatened with suffocation through œdema of the throat, early tracheotomy is indicated.

Locally the hæmorrhoids should be dressed daily by an ointment such as the old-fashioned gall and opium. If the pain is great, extract· belladonnæ cum hazeline ointment is useful; or bismuth, oxide of zinc, and vaseline ointment may also be tried. If the piles are protruding, they may be snipped with sharp scissors, the subsequent bleeding, by relieving tension, giving considerable relief, which is accentuated by hot fomentations with normal saline solution. Cold-water enemas as subsequent treatment are most useful. Needless to add, the state of the bowels must be carefully regulated, not only with medicine, but by the judicious selection of laxative, non-stimulating diet.

HÆMOTHORAX.

If a large volume of blood has been poured into the chest, in addition to the anæmia and subsequent grave symptoms there is superadded dyspnœa. To overcome this, tapping the chest is indicated, and, provided the blood has not coagulated, considerable relief will be obtained.

The hæmorrhage should be checked by the hypodermic injection of adrenalin (for doses, see under Hæmatemesis); the application of ice bags to the chest; and the internal administration of chloride of calcium —for the horse, ½ to 1 ounce; for the dog, 10 to 20 grains; for the cat, 3 to 6 grains, every four or five hours.

Where there is great prostration, normal saline solution and lime water is advised subcutaneously.

If recovery takes place, the patient should be placed on a course of iodide of iron and iodide of potassium.

HAIR AND WOOL BALLS.

These are most commonly seen in ruminants. If they are small, no inconvenience may be caused; if large, gastric atony or gastric catarrh are common sequels. As it is impossible to dissolve them, and not easy to dislodge them by drug therapy, treatment is purely expectant—oleaginous aperients and mucilaginous drinks are indicated; and if there is catarrh of the mucosæ or atony of the coats, appropriate treatment for these is called for. By elevating the animal's fore quarters while under laxative treatment, the dislodgment of the foreign bodies from the rumen is facilitated. Where all efforts fail to effect a removal, rumenotomy should be performed. The presence of hair, oat hair, or wool balls in the intestine is, however, of little importance as a rule, unless by mechanical means they cause obstruction.

HEART, DISEASES OF.

General Management.—In all cardiac affections, rest, complete rest, is the practitioner's sheet-anchor, and by that term the writer does not mean rest from the strain caused by outside physical forces alone, for rest must also come to the organ from within as well. The surroundings of the patient must be of the healthiest kind, and the air always fresh, so that oxygen, unadulterated with impure gases as much as possible, reaches the pulmonary organs, thereby saving the heart extra pulsation. Again, the food must be exceedingly rich in nutrients and easily digestible, and, further, it must be concentrated so that undue gastric distension after feeding is reduced to a minimum. The bowels must be regulated and overloading warded against. Then, again, the by-products of metabolic waste must be got rid of by the excretory organs, the skin and kidneys, as early as possible by keeping these organs in a tonic condition. The writer therefore draws the reader's special attention to those what might be called "side-shows" of treatment before heart diseases proper are undertaken, for he has been struck by the indifference displayed by many authorities to emphasize these all-important tenets.

Dilatation.—This is seen most commonly in hunters, race-horses, heavy-draft horses, and sporting dogs; it is also a sequel to such important diseases as influenza, purpura, irregular strangles, etc. Excessive strain and insufficient nourishment of the cardiac muscle are the culminating factors.

Rest and cardiac tonics are here indicated, the best of which is strophanthus.

For the horse :

℞ Tincturæ Strophanthi	℥ii.
Tincturæ Nucis Vomicæ	℥iii.
Aquæ Camphoræ	q.s. ad ℥vii.

M. Ft. mist. One ounce to be given night and morning in a pint of gruel.

For the dog :

℞ Tincturæ Strophanthi	♏iii.
Tincturæ Nucis Vomicæ	♏ii.
Aquæ Chloroformi	ʒi.

M. Ft. haust. One teaspoonful three times a day after food.

Valvular Disease.—When this disease is once firmly established, cure is impossible; nevertheless, palliative measures may be exercised, and by their means the useful functioning of the heart maintained and life prolonged. The condition is most commonly seen in old horses and old dogs. Digitalis here is the practitioner's sheet-anchor.

For horses and cattle :

℞	Pulveris Digitalis Folia	ʒi.
	Ferri Sulphatis Potassii Iodidi	āā ʒii.

M. Ft. pulv. One powder night and morning in food, or in a pint of gruel as a draught.

For dogs :

℞	Tincturæ Digitalis	♏iii.
	Tincturæ Ferri Perchloridi	♏iv.
	Potassii Iodidi	grs. v.
	Aquæ Camphoræ	ad ʒi.

M. Ft. haust. One teaspoonful three times a day.

After a course of the above is given, the patient may be put on such drugs as strychnine, sparteine, strophanthus, squills, caffeine, camphor. In the case of the dog ½ to 1 dram doses of Easton's Syrup will be found to be an excellent cardiac and systemic tonic. In a few cases the writer appears to have obtained good data, after an extended use of digitalis, from sodium iodide—1 to 2 drams for the horse, and 5 to 10 grains for the dog, night and morning.

Essentially, the general rules of treatment as regards diet, hygiene, and exercise should be vigorously applied.

Fatty Heart is most commonly seen in old pampered dogs, and, where diagnosed, cardiac tonics such as Easton's Syrup are indicated, while moderate exercise on an empty or semi-empty stomach is indicated, and a strictly limited dietary régime drawn up and adhered to.

Hypertrophy is seen in old horses used for heavy draft purposes, and also in sporting dogs. Here the principal agent is potassium iodide, which may be combined with very moderate doses of strychnine or strophanthus.

Palpitation.—Dyspepsia is the most common source of palpitation, therefore treatment of this condition is essential to overcome the cardiac functional derangement. Regulated diet and exercise combined with stomachics are usually all that is necessary.

HEART-WATER.

This specific disease of young stock is another of the many South African maladies directly attributable to the tick. Young animals, goats, sheep, and calves, are alone susceptible, although older animals also harbour the infective tick—the *Amblyomma hebræum* or variegated tick.

As its name implies, the disease is one in which the obvious post-mortem appearances are found in and round the heart, pericardial and thoracic effusions being generally marked. Other lesions are not constant or pronounced.

The disease—which in its later stages frequently shows the involvement of the central nervous system, as denoted by squinting, excitement, etc.—is due to an ultra-visible organism causing a sudden and excessive temperature reaction and other symptoms of illness about two weeks after exposure to tick attack. Death generally ensues in very young animals, especially in the Angora goat and merino sheep.

Complete quietude affords the best prospect of recovery, and the absence of all movement or excitement from driving dogs, etc., is essential in the enfeebled state of the heart. Medicaments appear of little or no use, prevention through tick destruction being the rational line of treatment now adopted by progressive flock-masters. To this end the enclosure of grazing areas, and their denudation of ticks by the use of the arsenical dip, is essential (see Ticks, Repression of).—*H. W. Pitchford.*

HEMIPLEGIA.

Paralysis of one side of the body in the lower animals is very uncommon, and although the disease need not be incurable, nevertheless, owing to the prolonged nature of the illness, it is as a rule false economy to adopt treatment. Where, however, curative measures are desired, it is of first importance to see that the animal is placed in a comfortable position, and kept there, in the case of the horse and ox, by bundles of straw packed against the chest, so that the patient continually rests upon the straw, and the usual methods to ward against bedsores (see Bedsores) adopted from the commencement. A brisk purgative is indicated at the outset, and a prolonged course of strychnine or nux vomica and potassium iodide prescribed. The patient should be turned two or three times a day, or slinging may be adopted. Later massage and galvanism to the paralyzed muscles stimulate the circulation and tend to thwart subsequent muscular atrophy. The diet should be generous throughout, and the normal action of the bowels maintained. Where urination is difficult, catheterization is called for.

HEPATITIS. *See* Liver Diseases.

HERNIA.

Inguinal.—In *non-strangulated* inguinal hernia in the *gelding*, surgical interference is as a rule uncalled for. The writer has had one case under close observation for over twenty years with a hernia larger than a man's head, and doing heavy truck-shunting without apparent discomfort.

Where operation is decided upon, the patient, having been previously prepared, is cast, chloroformed, and placed on his back, and the hernia reduced. The scrotal skin is sterilized, picked up, and incised. The tunics are grasped, separated some distance from the overlying cutis, and stretched outwards as far as possible. One-half or a complete rotation of the tunics is then effected, and light-fitting clams fixed as high up and as near the external inguinal ring as possible. The superfluous skin of the scrotum is then removed, and the resultant edges drawn together with a *single* suture, thereby encasing the clams. The wound is irrigated daily with a mild antiseptic, the patient being kept tied up short and placed on a concentrated diet. The clams may remain *in situ* for a week or ten days, after which they are removed and the wound dressed daily for some time. It must be pointed out that, in some old-standing cases, adhesion of omentum or even the bowel itself takes place within the sac. In the former case no harm follows its inclusion in the clams, but where the bowel is present, or suspected to be present, the tunics are cut through, large enough to admit a sterile finger, and by digital manipulation the exact condition is ascertained.

If the bowel is adherent, the adhesions must be carefully broken down by the index finger or a pair of curved blunt-pointed scissors. When this is completed, the viscus is gently pressed through the ring and the clams adjusted as high up as possible. Some authorities advise applying a ligature above the clams: the writer has never found this necessary, provided the clams are short enough and strong enough to admit of their being very tightly applied with strong forceps. In operating upon the stallion, the same procedure is adopted, but as a rule it is much easier, inasmuch as the testicle and tunics covering it can be drawn out further and the bowel forced into the ring more easily, after which the clams are applied and the structures—*i.e.*, tunics and testicular cord—are removed *en masse*.

Foals are also liable to inguinal hernia, and here there is often a strong hereditary predisposition. Provided strangulation does *not* exist, operative interference should be deferred for a reasonable time. In the writer's experience not a few cases of congenital inguinal hernia in foals disappear as they get older and stronger.

The method of operation here is similar to that of the stallion, and, of course, the testicle must be removed at the same time. In foals bilateral hernia is as a rule more common than unilateral, while in adult animals the reverse is usually seen in practice.

Scrotal Hernia, Strangulated.—These cases cannot be operated upon too soon, and the surgeon, when called in, is ill advised in attempting palliative measures, for nothing short of the *radical* operation is demanded.

The patient is carefully cast, placed on his back and kept in this position by assistants, and bags or bundles of straw firmly applied to the chest and shoulders; the rectum is emptied by the hand or an enema may be given, and the hind quarters raised by straw or other material.

After complete anæsthesia has been reached, the surgeon, by digital manipulation to the scrotum, should endeavour to reduce the hernia, at the same time stretching the scrotal skin and testicle cord to its outside limit by pulling. If this fails, by the hand inserted into the rectum, traction should be applied to the incarcerated bowel. If those two methods give no relief, they may be carefully applied concurrently—*i.e.*, external taxis and internal traction. If the operation is successful in liberating the bowel, the animal should be allowed to roll on to his side and given plenty of time to recover from the anæsthetic—in fact, the longer he remains in the recumbent position the better. When he begins to rise, one or two men should lay hold of his tail and assist him to his feet, thereby reducing the risk of extra strain on the ring. Subsequent treatment should consist of keeping the patient on low diet, and a long rest should be ordered.

If all efforts to effect reduction fail, herniotomy must be immediately performed. The scrotal skin is thoroughly sterilized by tincture of iodine or iodo-benzene. The hind limbs are then drawn well apart and a sterile towel placed over the scrotal region; this is moved forward to expose the site of operation. The skin and dartos having been cut through at the scrotal base, the tunica vaginalis is exposed and extended close up to the ring. Attempts should now be made by digital taxis gently to press the strangulated bowel through the canal into the abdomen; but if this fails—and it nearly always does—there is nothing left but to cut through the vaginalis and ring. For this a sterile blunt-pointed, slightly curved bistoury is used, the ring being incised close to the anterior angle. As soon as the operation is complete, the incarcerated bowel readily slips into the abdomen, unless adhesions exist, in which case they must be broken down. A clam is now applied to the cord and close to the ring, and the cord severed as in ordinary hernia, as already described.

Pelvic Hernia—Gut Tie.—This form of hernia is not very common. The writer, in an extensive cattle practice, has only seen four cases. If the case is a recent one, attempted taxis upwards and forwards by inserting the hand into the rectum should be tried, the patient in the meantime being made to stand with his hind legs well elevated. If this fails, the wall of the abdomen—flank region—must be clipped, skin sterilized, and an oblique incision made about 3 inches long. The muscular elements are then severed, and finally the peritoneum is pierced and the sterile hand inserted through the parietal wound. The spermatic cord is then searched for, cut with a sterile curved blunt-pointed bistoury, and the imprisoned gut drawn out. It is just as well to make sure a similar condition does not exist on the opposite side, in which case a similar procedure is necessary. The flank wound is then sutured and treated in the usual way.

It is not necessary, for this operation, to cast the animal, nor is it advisable, the standing position making the operation a much easier one, the only restraint required being a pair of bulldogs inserted in the nose and assistants to steady the patient.

Umbilical Hernia.—Several methods of treatment have been devised from time to time for this condition—*i.e.*, blisters, caustics, adhesive plasters, trusses, the actual cautery, clams, herniotomy, etc. The writer considers every one of these methods more or less unsatisfactory and uncalled for—save herniotomy, and that only when definite symptoms of adhesions exist within the hernial sac. After considerable experience of these cases in foals and calves, the following *modus operandi* is advised:

The patient is cast, placed on its back, all food having been withheld for twelve to twenty-four hours. The hair is clipped round the sac, the skin sterilized with tincture of iodide or iodized petrol, and a local anæsthetic injected at various points. Having ascertained that the bowel has freely receded from the sac, a small notch is made with a lancet in the skin on the mesial line, immediately in front of the hernial ring, and a similar one is cut behind the sac. A fairly thick piece of hemp, as used by saddlers, with tapering ends and about 18 to 24 inches long, having been previously soaked in tincture of iodine, allowed to dry, and waxed, is used to thread at each end two strong needles slightly curved, one needle for preference being rather larger than the other. The tapering ends are then twisted, the suture material being thereby secured firmly to the needle. The skin at the anterior notch previously made is picked up, and the major needle passed half-way through crosswise. The other needle is now inserted under the first, but in the opposite direction. The needles are then withdrawn and the suture tightened in the notch, noting that each needle is now equidistant.

The major needle is reinserted close up to the abdominal wall, while the apex of the sac is being pulled upon by an assistant, and the other needle is passed under it in an opposite direction, each withdrawn and the suture tightened. This procedure is carried out along the whole length of the hernia until the posterior notch is reached, which is intended to embed the last suture, and firmly tied. The distance of the sutures from one another largely depends upon the thickness of the skin and the age of the subject, but a good average is $\frac{1}{8}$ inch apart. Should the animal struggle during the operation, the bowel is liable to be forced into the sac, in which case the operator must be careful to see the bowel does not become pierced with the needle. To obviate this the writer has sometimes applied a thin metal clamp with screws at each end, or two large forceps may be used, one grasping the anterior half of the sac and the other the posterior. With practice, however, these mechanical compresses will be found unnecessary.

When the operation is complete, the parts are dried and a little pure Izal, Lysol, or Jeyes' Fluid is rubbed lightly over the sutures and the now strangulated sac.

The animal is then allowed to rise, and if the weather is seasonable, turned out to grass. As a rule no further treatment is necessary; the sac drops off in a week or ten days, or less, leaving a healthy granulating wound which rapidly cicatrizes.

Sometimes, however, sloughing is incomplete owing to the giving way of a suture, and the circulation, such as it is, is maintained. All that is necessary here is to cut or twist off the semi-necrosed mass and dress the wound with an astringent. This can be easily done standing, but, if necessary, a twitch should be used. The writer's observations upon a record of between 350 and 400 cases is summed up as follows:

(1) No post-operative recurrent hernia has been noted. (2) No second visits have been made, except in about 3 per cent. of the cases due to incomplete sloughing. (3) No case required a second operation. (4) No untoward sequelæ have been recorded save in *one* case—*i.e.*, tetanus developed nineteen days after operation.

Ventral Hernia.—This condition is seen most commonly in the cow and the mare, and usually when these animals are in an advanced stage of pregnancy. It is also occasionally observed in hunters and race-horses, due to accidents in the field. Where the hernia is large, usually extending from the pelvis to the sternum, the surgeon can do little except give support by applying a stout compress and tightening it up over the loins. In pregnant animals surgical labour should be brought about by perforating the fœtal envelopes (see Labour, Artificial). In those cases where the os is sufficiently dilated to effect delivery, the obstetrician's services are always required, owing to the abdominal muscles being put out of action by the hernia. Delivery here, however, will not reduce the hernia; it will only relieve the tension, and give the patient more comfort, for as soon as the gravid uterus recoils, the intestines take their place in the sac. Nevertheless, many horses can work with a ventral hernia, and cows will fatten and give milk, but *they should not be bred from.* If the hernia is small, and it is decided to reduce it, herniotomy should be performed. The patient is cast, chloroformed, the hair shaved and skin sterilized. Having ascertained that the bowel has left the sac—adhesions in these cases are probably less than 5 per cent.—an elliptical piece of skin, the width of which depends upon the size of the rupture, is removed. The peritoneum is then opened, and the edges of the abdominal tunic, if the case is an old-standing one, are curetted. The tunic is then brought together by interrupted strong silk sutures introduced by large semicircular curved needles. The muscles are then sutured with strong kangaroo tendon, and lastly the skin by eucalyptus tape. A pad of medicated cotton-wool is applied over the wound and kept *in situ* by passing across it cord, sutured into the skin. The patient is then allowed to rise, and a sheet passed under the abdomen is lightly fixed over the loins.

The horse should be prevented from lying down; the cow should be placed in a roomy box and the bedding kept continually dry. In both animals the diet must be concentrated and laxative.

If the operation has been done under strict sterile precautions, the bandage and pad may remain undisturbed for five to seven days, after which they should be removed, the wound dressed, and re-applied. The skin sutures may usually be removed in about ten days, and when the wound has healed completely, a blister to strengthen the parts should be applied.

Care must be taken not to turn the patient out too soon.

HERPES.

As a rule this disease runs such a mild course that treatment is uncalled for. Occasionally, however, a little irritative fever is set up, presumably by the local action of secondary bacteria, in which case hot fomentations with a little common salt and the application of lotio albus are indicated. An aperient or a few doses of a saline may also be administered with advantage. In obstinate cases, washing with perchloride of mercury lotion 1 in 1,000 is advised.

HOOSE. *See* Parasitic Diseases.

HORSE POX. *See* Variola Equina.

HYDROCELE.

This disease is not very common in animals, and if it is slight it is well to leave it alone. Where it becomes pronounced, the scrotal sac should be tapped. The skin is painted with tincture of iodine, the neck of the scrotum is grasped with the left hand and lightly drawn downwards, making the skin tense. A sterile trocar and canula is thrust into the sac and all the fluid drained away, and in the large animals 4 to 6 drams of tincture of iodine is injected; in the dog and pig, 2 to 3 drams.

The tapping and injection should be repeated every four or six days.

When the case does not progress satisfactorily, it is as a rule more economical to castrate the animal.

HYDROCEPHALUS. *See* Meningitis.

HYDROTHERAPY.

The application of hot water, cold water, steam, or ice to the cutaneous structures has a twofold action—*i.e.*, thermal and mechanical—and the actions and reactions which take place are enormous. This cannot be wondered at when it is remembered how vast the capillary structures embedded in the skin and underlying tissues are, and the great capabilities of contraction and distension they possess; and, further, that the blood contained in these capillaries is something between 25 and 30 per cent. of the blood of the body.

When cold water is applied to the skin, the bloodvessels contract, the respiration deepens, the heart is stimulated, and less body heat is lost. Then a reaction sets in, an underlying hyperæmia replaces the anæmia, the splanchnic blood is increased by dilatation of the vessels in that area, which absorbs the cooled peripheral blood, a thermic equalization consequently taking place. The heart's action being increased, the temperature rises.

When heat is applied to the skin, the sensory nerve endings transmit the impression to the brain, the vascular cutaneous area is increased, while that of the splanchnic zone is diminished in proportion. Owing to more blood going to the sweat glands, these become activated, with a consequent lowering of temperature. Further, hot or cold baths increase nitrogenous metabolism, at the same time stimulating excretion.

It will be gathered from these remarks that the application of hot or cold elements to the skin exercise powerful reactions, which, if properly interpreted and applied, carry with them powerful, important, potential therapeutical values. Unfortunately in veterinary practice, in their application they have considerable limitations, but in the smaller animals the writer considers there is scope for their more extended use in everyday practice.

Local compresses may be applied in all animals—to the throat, chest, abdomen, joints, tendons. They may be warm or cold, and consist of three or four layers of linen cut into a shape suitable for the part, wrung out in water at the temperature desired, applied to the affected part, and covered with flannel large enough to embrace the pack so that it perfectly excludes the air.

These packs should be re-applied at intervals before they become completely dry. They are useful in sore throat; in pulmonary conditions, particularly in the early stages of pneumonia; in intestinal disorders, especially of an inflammatory character; in nephritic disorders of an acute kind; in inflamed joints; and in sprained or injured tendons.

Baths.—These may be cold, tepid, or warm, the smaller animals in general practice being only suitable for complete immersion. A cold bath acts as a general systemic tonic, stimulates the whole metabolism, and activates every organ; increasing thereby the elimination of toxins, it acts as an antipyretic. Locally an animal's foot or leg may be immersed in a hot or cold bath by means of a tub or bucket. A hot bath with a temperature of 101° to 108° F. is a powerful sedative and antipyretic, and is suitable mainly for animals with a robust constitution. After an animal leaves the bath, it should be dried carefully and not exposed to draughts for some time.

All baths may be medicated. Thus there is the antiseptic bath—sulphur, Lysol, Sanitas, boric acid, coal tar, bran, for skin diseases; the alkaline bath—carbonate of soda, bicarbonate of soda or potash, for rheumatism, lumbago, etc.; the brine bath, for chronic inflammatory disorders, rheumatism, arthritis, etc.

HYDROTHORAX. *See* Dropsy, Chest.

HYGROMA.

These are the result of external injuries at the prominent angles of the body, or they may occur from continued pressure consequent upon *decubitus.* The effused material is serous or sero-sanguineous in character, the removal of which forms the essential treatment. These hygromatous swellings occur most commonly in the hip, the knee, hock, sternum, and occasionally the stifle. The skin having been painted with tincture of iodine, the swelling is opened with a sterile knife at its most dependent point. The index finger, having been previously painted with tincture of iodine, is inserted into the cavity and all blood-clot removed. It is then irrigated with proflavine dissolved in normal saline solution once daily. The part is bathed night and morning with cold water dissolved in which is a mild antiseptic, and if these measures are carefully carried out, given healthy surroundings, the wound will heal without suppuration. Essentially, the patient should be prevented from re-injuring the part. Thus, in the case of the knee and hock, abundance of clean bedding is called for; in the sternum, the animal should be loose or the wooden rail in front of the stall removed.

In mild swellings a blister may bring about absorption, especially if the fluid is aspirated under sterile precautions before application. Obstinate cases may require complete surgical removal before recovery is brought about, but this operation should not be undertaken lightly, owing to the length of time the post-operative healing process involves. These extreme cases sometimes improve by aspirating the fluid and injecting tincture of iodine (double B.P. strength), and from an economical point of view this method has much to recommend it.

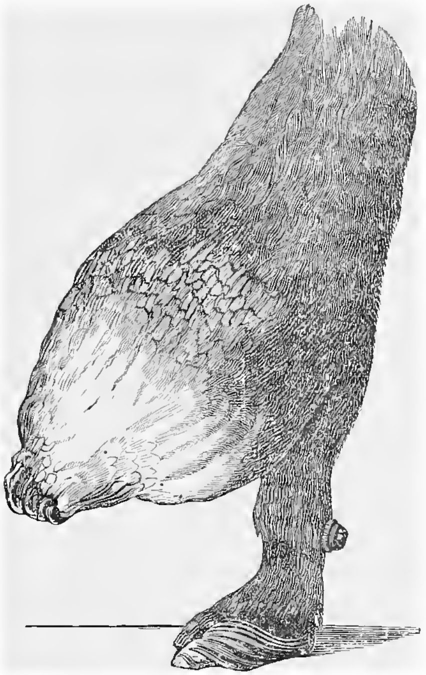

Fig. 77.—Knee Hygroma. (After Stockfleet.)

HYMEN, IMPERVIOUS.

Impervious hymen is most commonly seen in the cow, and often complicates parturition. The hand, having been lubricated with carbolized vaseline, is inserted into the vaginal canal and the band broken down with the index finger. Sometimes this band is so thick and fibrous that lancing is necessary, after which the finger and then the whole hand is inserted into the opening and the band obliterated. No further treatment is as a rule necessary.

HYSTERECTOMY.

Removal of the entire uterus can only be satisfactorily accomplished in the smaller animals, and that most commonly in the dog and cat. Where possible, the patient should be prepared prior to the operation. The animal is chloroformed, and when complete anæsthesia has been reached it is placed upon its back. The skin having been previously sterilized by iodine, a long incision is made from the navel backwards along the mesial line, the muscular elements cut through and all blood-vessels ligatured, after which the peritoneum is pierced, the bowels displaced, and the uterus exposed. The horns are each ligatured with double ligatures, and also the lower third of the uterine body, and the parts between these ligatures severed with the knife, after which the organ is removed from the abdomen.

The peritoneum is then sutured with fine gut, next the muscular elements and tissue, and lastly the skin. The surface of the wound is painted with tincture of iodine and covered with collodion, an antiseptic pad applied, and the abdomen bandaged. If the wound remains sterile, the sutures may be removed in five to seven days; if it becomes septic, one or more stitches should be removed and the part gently irrigated with a mild antiseptic. It may be necessary to insert a drainage tube.

ICTERUS.

Jaundice is symptomatic of a variety of liver derangements and diseases, usually of an obstructive nature, which cannot always be accurately diagnosed. The treatment, therefore, is largely general and often somewhat empirical. Eliminatives play an important part in the curative rôle. The bowels must be unloaded by a purgative, and the kidneys and skin stimulated by diuretics and diaphoretics.

As a purgative, aloin and calomel ($1\frac{1}{2}$ drams of each) in the horse; in the ruminant, sodium sulphate (8 to 10 ounces) or magnesium sulphate (8 to 10 ounces); in the dog, podophyllin (1 to 2 grains) or calomel (2 to 4 grains). Owing to a deficiency of bile in the alimentary canal, intestinal antiseptics are indicated, such as alterative doses of calomel, moderate doses of salol, β-naphthol, charcoal, turpentine. Sodium citrate, sodium bicarbonate, and sodium salicylate, tend to counteract the viscid condition of the bile, and should be given three times daily in full doses. A sinapis plaster applied all over the hepatic region is most useful, and in the case of smaller animals, massage over the liver stimulates that organ. In the dog a warm bath with carbonate of soda in it, the patient being dried with plenty of friction, is an excellent restorative. The hypodermic injection of pilocarpine is spoken highly of by some authorities in 2-grain doses for the horse and $\frac{1}{6}$-grain for the dog, to be given every twenty-four hours. While under treatment and subsequently, the patient should be kept on a light non-stimulating diet, and moderate exercise allowed.

There is a specific form of jaundice affecting the dog which exercises the skill of the practitioner to the utmost. In addition to the general treatment advocated above, the writer has obtained in these cases gratifying results from the daily subcutaneous transfusion of normal saline solution, 10 to 20 ounces, to which is added 1 to 2 grains of permanganate of potash, and the hypodermic injection of *B. coli* serum, 2 to 4 c.c. every evening and the same quantum *per oram* every morning before food. Butter-milk is an excellent adjuvant in these infectious cases. Trypan blue has given good results in some hands, and is worthy of an extended trial. (See also Malignant Jaundice.)

IMPACTION.

Cæcum and Colon.—Although these conditions may occur separately, the line of treatment for the one is practically similar to that for the other. In the horse, 1½ pints of linseed oil should be given at the commencement, to which is added 1 to 2 ounces of aromatic spirits of ammonia. If the pain is great, a hypodermic injection of atropine may give relief, while the internal administration of 2 drams of camphor and 1 ounce of chloral hydrate, given in flax gruel and repeated if necessary, is advised. The prolonged application of hot rugs to the abdomen also relieves tension and facilitates the laxative action of the medicines.

Enemas injected by a long tube and given in large quantities at intervals are also most useful. In the meantime the patient should be ordered gentle exercise and prevented from rolling. Water should be allowed *ad lib.*, and if he does not drink, a handful of common salt should be placed in the mouth two or three times a day. If the bowels do not respond within twenty-four hours, another pint of linseed oil, with an ounce of carbonate of ammonia and ½ ounce of nux vomica (Reeks), should be given. The hypodermic injection of 1 to 2 grains of strychnine has in some cases given the writer good results.

Where the impaction is within reach, Reeks advises kneading the mass with the closed fist through the rectal wall.

In the case of the dog, ½ to 1 ounce of medicinal paraffin should be administered, followed by sodium bicarbonate, 10 grains; spirits of ammonia aromat., 1 dram; linseed gruel, 1 ounce; and repeated at intervals. Placing the animal in a hot hip-bath, kneading the abdominal wall, and the injection of soapy enemas, should be carried out. If no relief is obtained, an exploratory laparotomy (which see) is advised.

Omasum.—Impaction of this organ in ruminants is by no means uncommon; and in treating it, it must be remembered that the condition does not arise all at once. The stages probably are: atony, catarrh, impaction, and inflammation of the mucosæ. The last two conditions have usually been reached before expert advice is sought, and by this time all the stomachs are involved to a greater or less degree. To remove the decomposing ingesta is the first object in view. The writer usually begins by giving the following:

℞ Sodii Sulphatis Sodii Chloridi	āā ℥ii.
Pulveris Zingiberis	ʒii.
Olei Lini Theriacæ	āā ℥vi.

M. Ft. haust. To be given in a quart of flax gruel and repeated every five to six hours until the bowels respond.

One-quarter the above doses are suitable for sheep.

The animal should be allowed plenty of water and exercise, and all food, except sloppy bran mashes, withheld. If after thirty-five to forty hours the stomachs and bowels do not move freely, the following is advised:

℞ Pulveris Nucis Vomicæ	ʒss.
Pulveris Zingiberis	ʒi.
Sodii Bicarbonatis Ammonii Carbonatis	āā ℥i.

M. Ft. pulv. Give one every six hours in a quart of flax gruel.

The hypodermic injection of pilocarpine in 2-grain doses is also advised every twelve hours. The writer does not recommend eserine, and cattle are somewhat susceptible to the toxic influences of strychnine, so that small doses of this drug should be given. Further, enemas may be very gratifying to the client, but they convey no therapeutical value to these patients. When the stomachs have been relieved tonics are indicated:

℞ Pulveris Nucis Vomicæ	ʒss.
Pulveris Cinchonæ Pulveris Gentianæ	āā ʒii.
Sodii Chloridi	℥i.

M. Ft. pulv. One three times a day in a pint of old beer.

During convalescence the diet should be sparing and light: steamed hay, bran, oats (crushed), boiled linseed, oilcake, molasses, etc.

Rectum.—Impaction of the rectum is most commonly seen in old horses, very fat in condition and not having enough exercise; also in young foals and in dogs. In the former, enemas, and 1½ pints of linseed oil, followed daily by 1-dram doses of aloes and nux vomica and 1 or 2 ounces of Glauber's salts with a laxative diet and increased exercise, usually effects a cure.

In the case of foals, this condition usually arises at birth. A soapy enema with ½ ounce of salad oil or glycerine dissolved in it usually gives immediate relief. The dam should have a laxative diet to which is added, *per diem*, 2 ounces of sulphate of magnesia and 4 ounces of treacle. In the dog, a course of medicinal paraffin and enemas is advised.

Rumen.—Provided there is no pronounced accumulation of gas, treatment here is similar to that for impaction of the omasum; in addition, kneading the organ and the application of a mustard plaster may be tried.

Exercise here is also necessary. If gas is present to excess, tapping should be performed (see Puncture, Rumen), after which 1 dram of Lysol in 8 ounces of salt water may be injected through the canula.

If relief is not brought about by these means, *ruminectomy* should be performed (which see), but this operation should not be left until the patient's resources have become exhausted.

Stomach.—If the ingested food is of a dry character, relief in the horse is difficult to obtain. One to 2 pints of linseed oil, combined with tincture of ginger and aromatic spirits of ammonia or ammonium carbonate, should be given.

The animal must be prevented from rolling, and if the pain is great, full doses of camphor and oil of turpentine are advised, or chloral hydrate may be tried.

The patient should be allowed plenty of water, or salt and water may be given as a draught, or lavage of the stomach, by means of the stomach pump, may be carried out (see Stomach Pump).

When relief is obtained, the patient should be kept on sloppy food—bran—for some days.

In the case of the dog, dislodging the stomach of its contents by an emetic is the first step, by administering ipecacuanha wine or giving a hypodermic injection of apomorphine, $\frac{1}{20}$ to $\frac{1}{10}$ grain.

Subsequently the patient should have small doses of sodium bicarbonate and magnesium carbonate two or three times a day, and placed on liquid diet.

IMPOTENCE.

If the derangement is due to functional causes, these can usually be met by giving a course of tonics combined with an abundance of rich food.

For the stallion and bull :

℞ Pulveris Nucis Vomicæ Ferri Sulphatis	āā ʒii.
Calumbæ Radicis	℥i.

M. Ft. pulv. Give one powder in food night and morning.

For the dog : Easton's syrup is recommended in ½ to 1 dram doses three times a day after food.

If these fail, ½-dram doses, for the stallion and bull, of tincture of cantharidin, B.P., and 2 to 4 minim doses for the dog, may be tried, or liquid extract of damianæ, 2 to 4 dram doses for the stallion and 10 to 20 minims for the dog, may be given a trial; or the glandular extract orchidin proves in some cases beneficial in 1 to 2 dram doses for the stallion and bull, and 3 to 6 grain doses for the dog.

Where the impotence is due to deficient development of the generative organs, to organic spinal trouble or diseases of the hind limbs, treatment, of course, is of no avail.

INDIGESTION. *See* Dyspepsia.

INERTIA, UTERINE.

Where, as a result of prolonged labour or a natural weakness of the uterine wall, there is not sufficient muscular contractile power to effect expulsion of the fœtus, ecbolics are indicated to assist Nature. The most important of these are pituitrin and ergot. The dose of pituitrin for the mare and cow is from 6 to 12 c.c., and for the bitch 0·5 to 2 c.c., given hypodermically or intramuscularly. Ergot is prepared for hypodermic injection in doses of ½ to 2 drams for mare and cow; 10 to 20 minims, sheep and pig; 5 to 10 minims, the dog; and 1 to 3 minims, the cat. It may be added that strychnine forms an excellent adjuvant to the above line of treatment.

INFLAMMATION.

Systemic.—The general principles of treatment only can be laid down here, and, further, no hard-and-fast rule is advised, but rather each case should be treated on its own merits. If the case is seen early, the patient plethoric, and the blood-pressure high, blood-letting proves a most excellent agent (see Phlebotomy). Hot fomentations, and in small animals hot baths (see Hydrotherapy), relieve tension, create comfort, and induce sleep. Medicinally the principal field is covered by the group known as eliminatives, which embrace the following:

Laxatives.—In all inflammatory diseases the bowels must be unloaded, and during the course gently moved at intervals. By this means blood-pressure is reduced and toxins are got rid of. For the horse, small doses of aloes, calomel, sulphate of magnesia, linseed oil; for the ox, sheep, and pig, sulphate of soda; for the dog and cat, calomel, medicinal paraffin, castor oil.

Diuretics are important agents, such as nitrate of potash, chlorate of potash, sulphate of soda, citrate of soda, liquid acetate of ammonia, sweet spirits of nitre, turpentine, and, in the smaller animals, aspirin.

Diaphoretics form an important group, the most important of which are: diffusible stimulants, such as alcohol, liquid acetate of ammonia, spirits of nitre, turpentine, and agents such as aspirin, salicylic acid, ipecacuanha, antimony, pilocarpine (subcutaneously), warm drinks, etc.

Sedatives combat the early phases of inflammation, the most common drugs employed being aconite, belladonna, opium, chloral hydrate, cannabis indica, and camphor.

Local.—Treatment here must be of a local character and in the nature of hot fomentations (see Hydrotherapy), cold-water applications, and irrigations. These may be medicated if desired with astringent lotions, antiseptics, anodynes, etc. Then there are poultices, which may be simple or medicated, either hot or cold. In addition, local blood-letting tends to relieve tension, or leeches may be used for the same purpose; or the opposite condition—namely, *hyperæmia*—may be produced by applying *Bier's treatment* (which see) on the principle of *similia similibus curantur.*

In those cases of subacute or chronic inflammations, resolution may be brought about by the use of counter-irritants such as strong liniments, blisters, setons, and the actual cautery. Needless to add, in all inflammatory conditions, local or systemic, in addition to the foregoing treatment, the surgeon should use his best endeavours to place the inflamed organ or tissue in a state of rest. In the former, this can be done by activating the other organs of the body to increased energy; in the latter, by keeping the animal indoors, prohibiting work, and even, if necessary, by slinging.

INFLUENZA.

On the first symptom of this disease the animal must be isolated, placed in a comfortable box with good drainage, plenty of fresh air, and, where possible, sunlight; the body clothed and legs bandaged. The diet should be light and tempting, with drinking water always present.

In uncomplicated cases drug therapy need be of the simplest kind. A pint of linseed oil given at the outset unloads the bowels and tends to eliminate toxins. Salines such as sulphate of magnesia or sulphate of soda in 1-ounce doses, given night and morning in food or drinking water or thrown on the tongue, tend to keep the eliminative organs flushed. Where there is great malaise and a high temperature, the writer looks upon salicylic acid as the most valuable drug, for it almost appears to possess antitoxic properties. If there is sore throat, a mustard plaster should be applied and an electuary of chlorate of potash, extract of belladonna, and treacle, given on the tongue three or four times a day.

Medicated inhalations, several times daily, of eucalyptus, terebene, coal-tar preparations, etc., act as expectorants, relieve catarrh, and soothe the respiratory mucosæ. Where catarrh of the alimentary canal is present, careful attention should be directed to the bowels by keeping them well moved with mild laxatives and such foods as sloppy bran mashes, grass, carrots, swedes, mangolds, and crushed oats. In addition, 1 to 2 tablespoonfuls of common salt should be placed on the tongue night and morning; among other things, this makes the animal drink more water, and helps to flush the eliminative organs. Where diarrhœa is present, *the condition must not be checked suddenly;* on the contrary, ½ to 1 pint of linseed oil should be given combined with 2 drams each of camphor and chloroform cum morphia tincture. If the diarrhœa persists, the following is advised:

℞ Bismuthi Carbonatis	ʒi.
Cretæ Præparatæ Sodii Bicarbonatis	āā ʒss.

M. Ft. pulv. To be given three times a day in a quart of flour or starch gruel.

Where cardiac complications supervene, the principles laid down in heart disease should be carried out. Great reliance may be placed in the hypodermic injection of strychnine and the internal administration of digitalis, quinine, and nitrate of potash, with the injection of normal saline solution.

In severe nervous complications, as a rule, little can be done. Ice packs may be applied to the head and a mustard plaster to the spine, and 8 to 10 ounces of sulphate of soda with 1 dram calomel administered. The hypodermic injection of 30 grains of quinine may be tried daily.

Bilious complications should be treated with small doses of calomel, citrate of soda, and sulphate of soda, while the application of a mustard plaster over the hepatic region is recommended. In the effusive form, 2-dram doses of hydrochloride of quinine in a pint of lime water three times daily has given the writer excellent results, and in addition hyposulphate of soda in food or drinking water—1 to 2 ounces—night and morning, is most useful.

Where there are pronounced symptoms of auto-intoxication, normal saline solution to which is added peroxide of hydrogen should be injected subcutaneously in the proportion of 4 ounces peroxide to 4 to 6 pints saline, and repeated daily; or camphor oil may be injected, 2 drams camphor, 1 ounce olive oil; or oil of turpentine, 1 ounce, may be injected over the scapula, the latter producing a fixation abscess.

Where pulmonary lesions manifest themselves, these must be treated accordingly (see Pneumonia, Bronchitis, Empyema, Hydrothorax).

Prophylaxis.—In the first indication of this disease in a stud, the temperature of every animal should be taken, and the diseased separated from the healthy. All feeding-troughs and drinking utensils used by affected animals should be scrubbed with boiling water and Lysol or Jeyes' Fluid. The healthy animals should have an increase in the dietary régime and a decrease of work ordered. The stalls and stable should be disinfected and fumigated. It is generally stated that one attack confers immunity, but this is by no means absolute in the writer's experience; animals having recovered must therefore be kept from further infection as long as possible.

As the true *causa causum* of influenza appears to be an ultramicroscopic virus, a hyperimmune serum would be the only medium whereby immunity could be conferred; but, like distemper in the dog and hog cholera in the pig, it is not the primary virus but the secondary bacteria which introduce the complications, these being responsible for the major portion of fatalities. The secondary bacteria present in influenzal cases, as a rule, are streptococci, diplococci, staphylococci, *B. pyocyaneus*, *B. coli*, cocco-bacilli.

In an outbreak of influenza, the writer's procedure is to pass sterile nasal swabs well into the superior nares, and to make several smears from them, the bacteria present being noted. A blood-capsule is also secured and treated in a similar manner. By this means a fair idea of the bacteria present may be obtained. These organisms are then cultivated, from which an autogenous vaccine is procured.* Three doses of various strengths of attenuation and number are made up and injected every five or six days. While under this treatment, it is advisable to keep the animal as far away from the infected zone as possible, and, further, the food should be of the best, and the work of the lightest. From these injections, especially from the least attenuated ones, there may be slight malaise (temporary), and if so, so much the better, in which case the animal should have twenty-four hours' rest.

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* While an autogenous vaccine is being prepared, it is good practice to inject a stock vaccine.

The writer has obtained from this line of prophylaxis very gratifying results in robbing epidemics of their serious tendencies.

No allusion up to now has been made to *curative sero-vaccine therapy.* This important line of treatment should not be overlooked in obstinate cases. A polyvalent compound anti-streptococcal, anti-staphylococcal, and anti-*B. coli* serum should be injected and repeated every twelve or twenty-four hours. In addition, the bacteria present should be isolated and an autogenous vaccine made, but the doses here should be sterile and smaller than in prophylactic cases, and repeated at shorter intervals in every forty-eight to sixty hours and the effect noted. In short, in curative vaccine therapy the negative phase must be almost eliminated from the curative rôle, and this phenomenon is more easily reached after one or more injections of anti-sera as advised above.

INHALATIONS.

These consist of vapours of various kinds of steam, simple or medicated.

The vapours most commonly used are sulphur and carbolic acid; these may be generated by placing them on red-hot cinders or on a hot shovel. When these vapours are generated in a loose-box or pen housing animals, an attendant should remain with them during the process, for the gases thus generated must be sufficiently diluted with the atmosphere to prevent irritation of the mucosæ (respiratory) and the eyes. These inhalations are useful in cases of hoose or husk, and also as adjuvants in disinfecting buildings.

Steam may be obtained direct from a kettle standing on a movable fire and passed through a rubber tube, the distal end being placed under the patient's nose. It may be medicated with any of the volatile antiseptics, such as Lysol, pine oil, carbolic acid, eucalyptus, terebene, turpentine, camphor spirit, coal-tar preparations. Or a nose-bag containing bran, sawdust, or a roll of hay, may be adjusted after placing in it a half to one wineglass of any of the above antiseptics, with boiling water poured on the medium; or a bucket may be used, with a bag thrown over the head to retain the vapour. Steam inhalations are useful in all irritable conditions of the mucosæ by counteracting dryness in the early stages, and in the later stages hastening expectoration; and by combining them with any of the above drugs, certain sedative, antiseptic, stimulating, expectorating advantages are incurred, according to the agent used. To be of any advantage, however, these inhalations should be carried out two or three times daily for several days.

INJECTIONS.

There are many routes whereby drugs may be injected into the system in concentrated form, the advantages over administration *per oram* being more immediate action and the drug, not being acted upon by the gastric and intestinal juices, reaches the blood-stream in its almost pure therapeutical form. The skin, most authorities advise, should be disinfected at the point of inoculation, and the syringe sterilized, which of course is sound teaching; but when several hundreds, or may be thousands, of *subcutaneous* injections are made yearly, this precautionary method is often ignored, and, speaking from considerable experience, the writer cannot record a single bad sequel from neglecting the rigid sterilizing doctrine. These remarks, however, do not apply to the other channels of injection.

Hypodermoclysis.—The agents most commonly used here are such alkaloids as strychnine, atropine, eserine, pilocarpine, morphia, ergotin, cocaine, etc.; glandular extracts, such as adrenalin, pituitrin, cerebrin, orchidin, pancreatin, etc. Camphor, brandy, and saline solution are also given hypodermically, while such biological products as sera and vaccine are usually given hypodermically.

Intravenous.—Where more immediate effect is required, this route is preferred to the former. The jugular vein, especially in horses and cattle, is the usual one chosen, but any prominent and superficial vein may be used. The vessel is raised by pressure, the seat painted with iodine, and a sterile needle inserted in a slanting direction nearly parallel with the long axis of the vein. Owing to the elastic nature of the wall, the point of the needle must be very sharp, and the thrust must be sudden. As soon as the needle enters the vein, blood will flow. The nozzle of the syringe is then inserted into the needle and the fluid slowly injected. For preference no air should be injected; nevertheless, a few globules can do no harm. All agents injected into a vein must be sterile, perfectly soluble, and non-irritating. Some authorities advise cutting through the skin and exposing the vein before inserting the needle, and this is worthy of recommendation.

Intratracheal.—The drugs most commonly injected by this route are helminthics in parasitic diseases affecting the lungs; preparations of iodine, particularly in specific pulmonary diseases and purpura hæmorrhagica; and the writer has administered sera and sterile vaccines in selected cases of lung diseases with advantage.

Intramammary Injections to produce constitutional effects are practically confined to cases of milk fever. Local effects are produced by antiseptic injections in such diseases as mammitis.

Other channels for injections are *Intraspinal*, *Intraperitoneal*, and *Intracranial*, but these are so bound down with limitations in practice and so seldom employed that they are only mentioned here in passing.

Proctoclysis.—Injections into the rectum are largely carried out in practice and in all animals. It may consist of plain soap and water, or the enema may be medicated, or it may be purely nutrient. Medicated enemas are composed of antiseptics, astringents, sedatives, narcotics, and stimulants. Normal saline solution is also much used. Nutrient injections consist of beef-tea, meat extracts, predigested milk, gruels, eggs, etc. The injections are carried out by suitable enema syringes of various shapes and sizes.

INTERDIGITAL CYSTS (DOG).

This is a comparatively common and troublesome disease affecting the interdigital space or spaces, and sometimes extending somewhat up the limb. When the cysts or abscesses are maturing, the patient is in considerable pain. To relieve the tension antiseptic warm foot-baths, repeated often, are indicated, and a brisk purgative may be administered. In some cases an antiphlogistic poultice applied to the whole foot, covered with cotton-wool and lightly bandaged, and repeated daily, gives considerable relief. When the abscess matures, it should be lanced, the cavity curetted and painted with tincture of iodine daily.

As the unsatisfactory aspect of this disease consists in its tendency to recurrence, *prophylactic measures* are therefore called for. These consist of the injection of autogenous vaccines, and hardening and sterilizing the skin of the digits by the repeated application of methylated spirit, tincture of iodine, or compound tincture of benzoin.

INTERDIGITAL FIBROMA (CATTLE).

These are occasionally met with. If small, a few drops of pure hydrochloric acid applied occasionally may effect their removal. Surgical measures, however, are in the end more satisfactory. The animal should be cast, the growth and surrounding parts painted with tincture of iodine, an anæsthetic injected, and the growth removed with the lancet. The base is then curetted, an antiseptic pad applied and bandaged, and re-dressed and re-bandaged in four or five days. If these growths are left too long, by reason of the constant frictional irritation and accumulation of grit, a malignant transformation may ensue. Neglect, therefore, is inadvisable.

INTESTINAL DISORDERS.

Atony.—This condition is most commonly seen in old horses and dogs where exercise is deficient, also in stall-fed cattle which are being forced for the butcher. If it is uncomplicated, in the case of horses and cattle a run at grass where possible will usually effect a cure in itself; for diet in these cases is always more important than medicines. In solipeds a dietary largely consisting of bran, preferably in the shape of bran mashes, combined with crushed oats and a liberal allowance of roots and grass if in season, are indicated. Water, of course, should be allowed *ad lib.*, and, further, the patient should be encouraged to drink a large quantity; this can be easily brought about by giving two or three tablespoonfuls of common salt in the food two or three times a day.

The neuro-muscular elements of the intestines should be toned up by the following:

℞	Pulveris Nucis Vomicæ	ʒi.
	Aloes Barbadensis	ʒss.
	Pulveris Zingiberis	ʒi.
	Sodii Sulphatis	℥ss.

M. Ft. pulv. Give one daily or twice daily in manger food.

In dogs it may be necessary at the commencement of treatment to give an enema—glycerine, or soapy water and a little salad oil.

The diet here should largely consist of oatmeal and surface-grown vegetables. Medicinally there is nothing better than small doses—small or large teaspoonful—of medicinal paraffin or salad oil once or twice daily, and the following prescribed:

℞	Tincturæ Nucis Vomicæ	ʒi.
	Tincturæ Gentianæ Co.	℥i.
	Aquæ Chloroformi	ad ℥ii.

M. Ft. mist. One teaspoonful night and morning after food.

Congestion.—If the condition is due to the irritation set up by worms, helminthics are indicated; but if much pain is in evidence, this should be first counteracted by giving morphia injections and such draughts as are indicated for colic. If it is due to irritating foods passing along the canal, 1 pint of linseed oil should be given, followed by ½-ounce doses of tincture of chloroform and morphia; and 1-ounce doses of bicarbonate of soda. Hot fomentations applied to the abdomen along with hot-water enemas, also effect considerable relief. All food should be withheld until the bowels have been freed, after which sloppy bran mashes, oatmeal, and linseed gruels are indicated.

Indigestion.—The bowels should be unloaded by a laxative—linseed oil in the horse; Glauber's salts and treacle in the ox, sheep, and pig; medicinal paraffin or castor oil in the dog. Enemas, except in ruminants, are also most useful, especially if they are injected far into the bowels. As there are always varying degrees of impaction in these cases, neuromuscular tonics are indicated. In the larger animals, nux vomica and carbonate of ammonia; in the smaller patients, tincture of ginger and aromatic spirits of ammonia. In the horse hypodermic injections of strychnine and pilocarpine stimulate peristalsis and secretion, and should be tried in those cases which do not respond to simple treatment.

Should pain be present, camphor and chloral hydrate combined are advised.

If tympany exists, tapping should be performed. (See Puncture.)

When the bowels have become unloaded, a course of tonics is called for—gentian, calumba, cinchona, nux vomica, ginger; and as there is always a certain amount of acidity present in those cases, a combination with alkalies, such as bicarbonate of soda, is advantageous. During convalescence the diet should be light and digestible. For horses, cattle, and sheep, bran, crushed oats, oilcake, steamed hay; for the pig, bran, linseed, boiled milk, oatmeal gruel.

For the dog, patent foods, fine oatmeal, tripe, sheep's paunch, scraped mutton, and Glaxo, are among the best.

Indigestion in the Camel.—Indigestion in camels is due to improper feeding and general debility.

The fodder should be changed, and, if possible, green fodder given. In many cases where the cause is due to bad fodder, a change of fodder and the administration of 2 ounces of common salt daily is all that is required. In other cases the treatment is not so simple, and it takes considerable time before the system recovers its normal tone.

The most useful drugs are bicarbonate of soda in daily doses of 3 ounces for a week, followed by carbonate of ammonia in daily doses of 2 ounces, combined with nux vomica ½ ounce, for ten days. In all cases the fodder should be changed and a liberal supply of water allowed. It is necessary to remember that better results will be obtained by feeding good fodder and allowing a liberal supply of water than by the administration of drugs.

The administration of acids does not appear to give good results in the treatment of indigestion in camels.—*H. E. Cross.*

Intussusception and Volvulus.—Where these conditions are diagnosed, palliative measures may be tried: oleaginous aperients combined with belladonna; the hypodermic injections of strychnine, pilocarpine, and atropine, and where there is much pain morphia; but such drastic agents as eserine and barium chloride are contra-indicated. Enemas also may assist in bringing about relief, while digital manipulation through the rectum may be tried. Laparotomy, however, is as a rule the only reliable means to effect reduction, and the operation must not be deferred until the patient's vital forces are exhausted. This operation is much more likely to be successful in the smaller than in the larger animals.

IRITIS.

Inflammation of the iris is seldom seen in practice as a primary condition. If the case is attended to early, the surgeon's first consideration is to prevent adhesions; but if adhesions have already formed, every effort must be made to break them down, and for this purpose atropine is the sheet-anchor.

The animal should be placed in a comfortable dark loose-box or kennel and a good purgative administered. A 2 per cent. solution of sulphate of atropine should be dropped into the eye several times daily after bathing with warm strong tea, and the effect noted. If dilatation is not sufficient, a 5 per cent. solution should be used. If this fails to have the desired effect, the eye is bathed for a considerable time with *weak* boric lotion (warm), the cornea punctured with a hollow sterile needle, and the fluid of the anterior chamber evacuated. The tension thus relieved will allow the effect of the atropine upon the iris greater freedom with consequent dilatation. When there is considerable congestion, leeches should be applied on the eyelids, or a seton may be inserted close to the eye.

In some obstinate cases Singleton's Golden Ointment painted on the everted conjunctiva daily may do much good, and is well worth trying.

IRRIGATIONS.

These are practised on organs possessing cavities having an outlet, the fluid used being usually water previously medicated.

Bladder.—In the male a catheter is inserted—in those animals where by reason of the anatomical arrangement this procedure can be carried out—the urine drained away, and the fluid injected. This may be medicated with antiseptics such as boric acid, permanganate of potash, proflavine, Lysol, hypochlorites, etc.; anodynes such as opium, belladonna, or their alkaloids, cocaine, etc.; astringents such as perchloride of mercury, sulphate of zinc, sulphocarbolate of zinc, etc. The bladder may be flushed and emptied two or three times at one operation, but care must be taken not to inject too much at once, for overdistension of the bladder adds to irritation and is to be deprecated. The water should be boiled before use and injected at blood heat.

Bowels.—These may be of the nature of enemas, and in the larger animals the fluid at most passes in several feet. To irrigate the intestines successfully in the horse, a tube 6 to 8 feet long is required, and the pump used must have considerable capacity, so that the fluid is injected with force, the object being to straighten out the convoluted bowel immediately in front of it. The rectum having been emptied, the nozzle of the tube is well lubricated and steadily pressed forward while an assistant is using the pump. This steady pressure is kept up until the tube has almost completely disappeared into the bowel, care, of course, being taken to note it has not doubled on itself. In this way the colon may be irrigated. If more force is required, the tube may be attached to a hose-pipe; the benefit derived from this in cases of impaction is very great. In ruminants intestinal irrigation, in the writer's experience, carries with it no therapeutical value.

In the dog an ordinary human enema syringe answers admirably, and to facilitate the forward passage of the fluid, the patient is made to stand on his fore paws, the hind legs being held perpendicular.

Stomach.—Within recent years American practitioners have reduced gastric lavage to a fine art, and the therapeutical advantages have been popularized in this country by Lang.

A single or double tube may be used. The tube is lubricated with slippery elm bark. A mouth gag is inserted, the tongue slightly withdrawn from the mouth, and the tube passed as one would an ordinary probang. After siphoning off the liquid from the stomach, water is injected by a pump, which in turn is siphoned off, and the operation repeated as often as is necessary. (See also Stomach-Tube Technique.)

JAUNDICE. *See* Icterus.

JHOOLING, OR JHOOLAK (A Skin Disease of Camels).

The affected areas should be excised, and finely powdered potassium permanganate well rubbed in. Three dressings with an interval of four days are usually sufficient to effect a cure. Good results are also obtained by excising the lesions and applying pure carbolic or phenyl. In treating this disease, its contagious nature should be borne in mind. When a case of jhooling has occurred amongst a herd of camels, it must at once be isolated and a careful inspection of all the camels made. They should be divided into groups and not be allowed to mix together. The encamping-ground should be changed, and daily examination made of each group.—*H. E. Cross.*

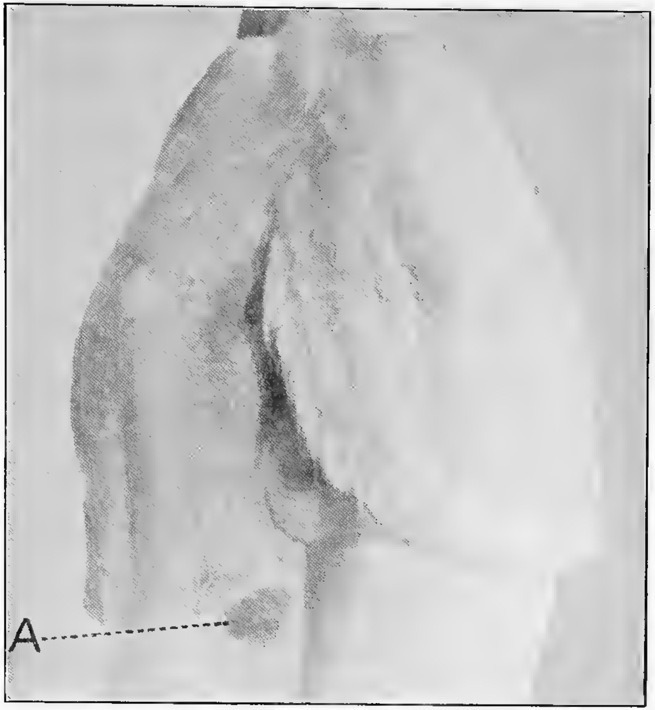

FIG. 78.—JHOOLING, SHOWING RAW PATCH (*A*). (Cross: "Diseases of the Camel.")

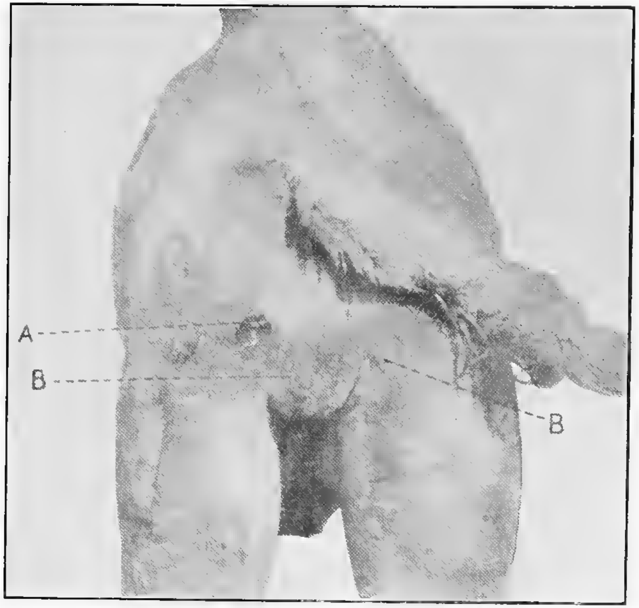

FIG. 79.—JHOOLING, SHOWING RAW PATCH (*A*) AND SWELLING (*B*, *B*). (Cross: "Diseases of the Camel.")

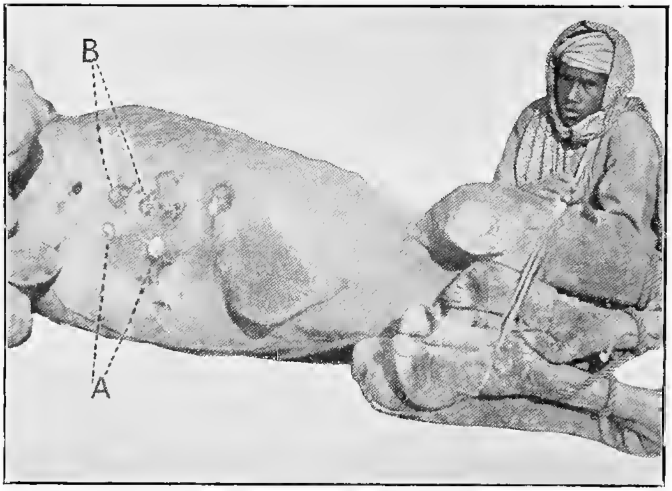

Fig. 80.—Jhooling, showing Healed Lesion (*A*) and Partially Healed Lesion (*B*). (Cross: "Diseases of the Camel.")

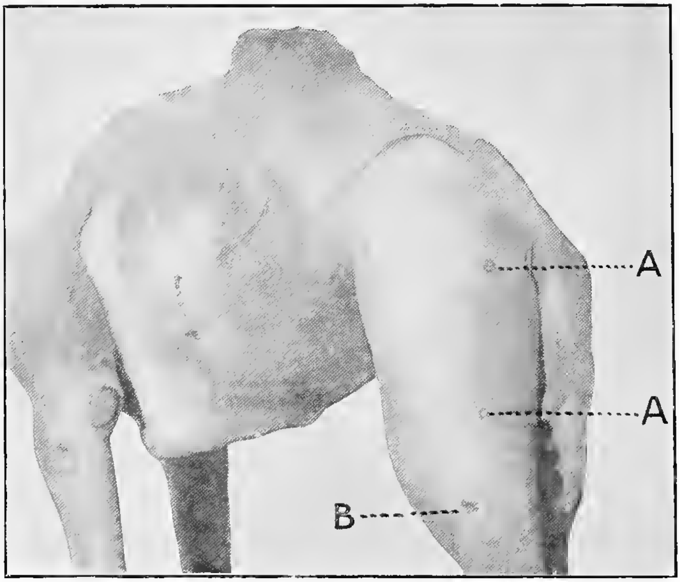

Fig. 81.—Jhooling, showing Healed Lesion (*A*, *A*) and Partially Healed Lesion (*B*). (Cross: "Diseases of the Camel.")

JOHNE'S DISEASE.

From a curative point of view this is an unsatisfactory disease, and in the advanced stages may be looked upon as incurable, and such patients, from an economical standpoint, should be destroyed. The writer has, however, in some cases, when called in early, succeeded in effecting an apparent cure. The procedure adopted is as follows:

The patient is brought indoors and access to all water prevented, the liquids allowed being flour gruel, bean-meal gruel, pea-meal gruel, the solid foods being of a dry character, such as hay, oat sheaves, oatmeal, wheat meal, bean meal, chaff, and a moderate admixture of equal parts of cotton cake and oilcake or feeding cake. Medicinally the following has given the best results:

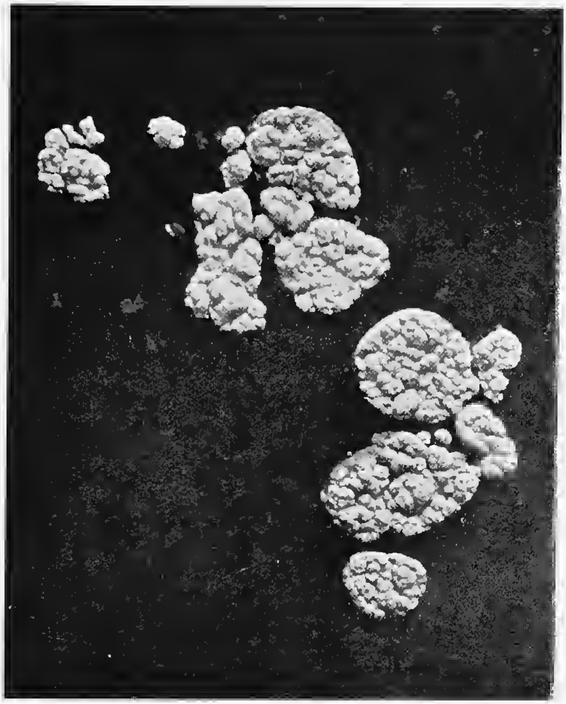

Fig. 82.—Culture of Acclimatized Johne's Bacillus on Ordinary Glycerine-Peptone-Beef Broth. (Twort and Ingram: "Johne's Disease.")

℞ Acidi Borici	ʒiv.
Tannalbini Pulveris Ipecacuanhæ Radicis }	āā ʒii.
Calcii Hydratis	℥i.

M. Ft. pulv. Give one night and morning in a quart of flour gruel and three or four eggs.

After a fortnight of this treatment the patient is placed on a course of iron and sulphuric acid—*i.e.*, liquor ferri perchloride dil., 1 ounce to be given every morning before food in a quart of gruel; and aromatic spirits of sulphuric acid, 3 to 4 drams every evening, also in gruel. This treatment should be maintained also for fourteen days. At the end of a month's treatment, if the case has only made slight improvement under this régime, it should be destroyed. If it has improved, it should still be kept indoors, placed under a course of tonics, and given a full ration of good food to prepare it for the butcher.

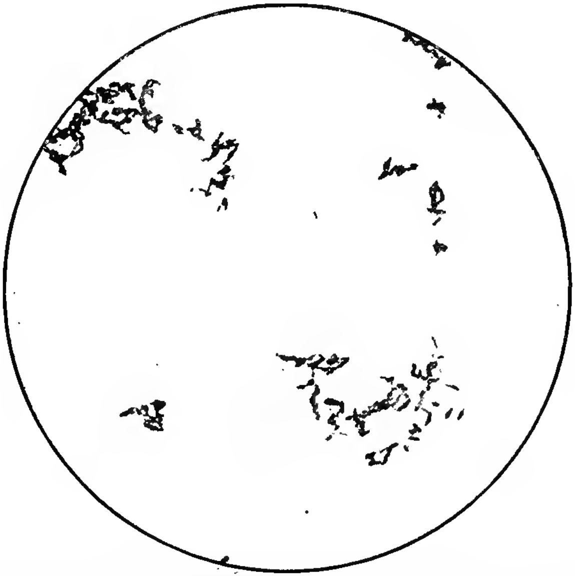

FIG. 83.—FILM FROM PURE CULTURE OF JOHNE'S BACILLUS ON GLYCERINE–SALINE TIMOTHY-GRASS-BACILLUS-EGG MEDIUM. (Magnification about 1,000 diameters.) (Twort and Ingram: "Johne's Disease.")

The writer has noticed many cases remain apparently cured for weeks, and break down again either from recrudescence or reinfection.

Those practitioners who have had much to do with this disease will have noticed not only extreme thirst on the part of the patient, but also a very strong desire to drink liquid excreta found in cattle-yards, etc. This fact some years ago tempted the writer to carry out a series of experiments by giving human urine to the patient to drink, and the results appeared to be so satisfactory that it has been carried out ever since. The quantity given is 1 to 3 gallons night and morning mixed in the gruel. The animal drinks it greedily, and under the treatment digestion and appetite and the relaxed state of the bowels improve.

No explanation is offered upon the therapeutical value of the urine, but it is a recognized fact that opsonins in considerable quantity leave the system by the urine, and a phagocytosis may be thereby stimulated by its ingestion. Of course, the proper urine to administer is that of the patients, but here, especially in the male bovine, collection is rather difficult.

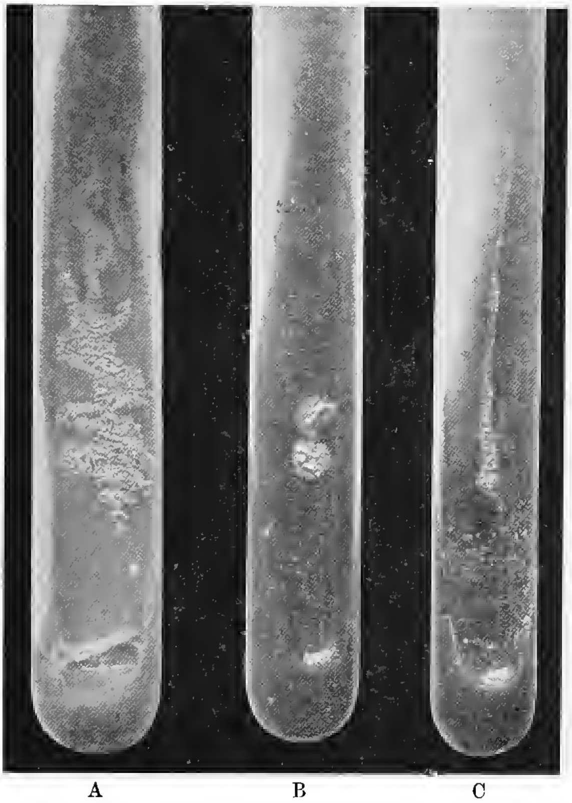

Fig. 84.—Culture of Johne's Bacillus.

A, Streak culture on an egg medium made up with saline and containing 4 per cent. glycerine and ½ per cent. of the chloroform insoluble portion of the cooled alcoholic extract of *B. phlei*.
B, Isolated colonies on a glycerine-agar medium containing dog's filtered ascitic fluid and the same extract of *B. phlei* as Fig. *A*.
C, Streak culture on same medium as Fig. *B*.
(Twort and Ingram: "Johne's Disease.")

Prophylaxis.—All animals suffering from this disease should be isolated and taken indoors, and their manure collected into a single heap and thoroughly mixed with lime, or *they should be destroyed.*

As the incubative period appears to be in many cases a long one, other animals on the farm should be tested from time to time with the antigen derived from the specific bacillus.

If there is a field showing a predilection to this disease, cattle should not be pastured on it for a long time, and in the interregnum the ground should be dressed with lime, soot, salt, or nitrate of soda, or, better still, cultivated. Further, the hay grown from such pastures should only be given to horses.

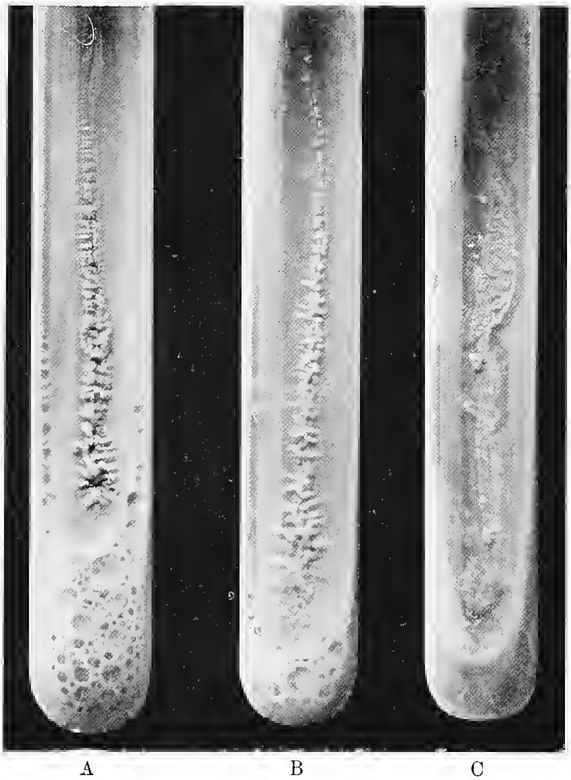

FIG. 85.—CULTURE OF JOHNE'S BACILLUS.

A, Streak culture of Johne's bacillus on an egg medium made up with sheep's brain broth containing peptone and glycerine and 1 per cent. of dead *B. phlei.*
B, Streak culture of the human tubercle bacillus on Dorset's egg medium.
C, Streak culture of avian tubercle bacillus on Dorset's egg medium.
(Twort and Ingram: "Johne's Disease.")

Finally, active immunization with full doses of Johne's bacillus vaccine of all cattle from infected farms is worthy of an extended trial. The slow growth of the bacterium and the special media necessary for its cultivation makes this treatment somewhat expensive, however.

JOINT EVIL.

The curative treatment of specific arthritis in foals is most unsatisfactory. If a joint is much distended with arthritic fluid, aspirating under sterile precautions is advised, followed by, where practicable, Bier's treatment. This procedure, where recovery follows, in the writer's experience, tends to reduce the degree of subsequent deformity. The intratracheal injection of Lugol solution and the subcutaneous injection of polyvalent sera and vaccines offer the best prospect of effecting a partial cure—partial inasmuch that if the animal does recover, its growth is usually stunted and the joint or joints are abnormal.

Prophylaxis.—The prevention of joint evil places the practitioner on a sounder footing. The writer, along with collaborators, has for some years worked on the following principles with the most gratifying results:

(*a*) Vaccination of the expectant mother, beginning about the seventh month of pregnancy with graduated doses, both as regards number of bacteria and attenuation, the vaccine being derived from cultures of streptococci, staphylococci, and *B. coli*, all polyvalent and derived from affected foals.

(*b*) Serum injection, intranavel and subcutaneous, of the foal as soon after birth as possible, and repeated in a larger dose subcutaneously in seven to ten days, the serum being anti-streptococcal, anti-staphylococcal, and anti-*B. coli.*

The much vaunted practice of carefully sterilizing the navel cord may still be carried out, but in the writer's experience this procedure never prevented a foal which possessed a predisposition to joint evil from developing the disease.

The dam is responsible for the major portion of joint-evil cases, and if their previous histories are looked into, it will be found that many of them have come through sharp attacks of influenza or strangles, coupled with old-standing cases of poll evil and fistulous withers, and it is just possible they may act as "carriers" for a long period after recovery, later on affecting the fœtus *in utero.*

KAMRI (Chronic Sclerosis of the Spinal Cord in Horses).

The condition is incurable, but general treatment may possibly arrest the degenerative processes in those nerve elements where these changes have not reached the stage of complete disorganization (Macalister).

The bowels should be properly regulated and a nutritious diet prescribed.

A course of nux vomica and arsenic, alternated with iodide of potassium, may be given.

Counter-irritants to the spine are recommended by some authorities (Hayes).

No specific preventive measures can be suggested until the nature of the causal agent is known.

Hygienic precautions are indicated, and it is recommended that in tropical countries horses be removed from marshy lands and protected from cold winds.—*G. K. Walker.*

KERATITIS. *See* Conjunctivitis.

KERATOMA.

Horn tumours growing from the inner surface of the non-sensitive hoof are not commonly met with in practice. They may be present on the wall or on the sole. If they are small and only slightly projecting, their presence may cause the animal no inconvenience; but if they press prominently into the sensitive laminæ, lameness is bound to follow, in which case the horn overlying the growth is rasped down until it becomes flexible on pressure. The animal is cast, chloroformed, and a tourniquet applied. The horn is then removed with the knife and the diseased area curetted clean away, the resulting cavity packed with medicated iodoform gauze, and bandaged. If the operation has been performed under antiseptic precautions, pus formation will be non-existing, a practice to be aimed at. The dressings should be repeated every three or four days. Should granulations form to excess, cauterizing with nitrate of silver will keep them in check. When a firm surface has sufficiently developed, the bandages should be left off and tar dressings daily applied for some time.

KICKING.

This is a pernicious habit or vice which generally grows upon an animal. Idleness and too much food is often a contributory cause.

Kicking in harness can often be overcome by steady, constant work and a reduction of the stimulating rations. If the harness causes sores, this should be rectified, and for the safety of the driver and vehicle a kicking strap should be fitted to the shafts. In the case of mares ovarian trouble may be the root cause, in which case ovariotomy should be performed. Some animals given to flicking the tail are liable to get the reins under the dock, and here short docking is advised. In the case of all kickers in harness, harsh treatment is contra-indicated, and kindness should take its place. If the vice of kicking in the stable is cultivated, the animal should be removed to an isolated stall or box; and if this fails, a thick rubber pad is inserted into the fetlock hollow, or the sides of the stall partitions may be lined with prickly broom.

Kicking is sometimes due to nervous irritability, in which case the patient should have a strong purgative, followed by nerve tonics—strychnine, iron, and phosphorus—and given a run at grass.

KIDNEYS, DISEASES OF.

Calculi.—The presence of calculi, particularly in the pelvis of the kidney, may occasionally be met with in all the domestic animals, but their existence as a rule is only discovered at post-mortems. Further, when they are detected during life, medicinal treatment is of no avail, except, perhaps, in relieving consequent pain by the administration of sedative anodynes. There is no reason, however, why successful relief should not be obtained in selected cases by surgical procedure in small animals, although it has never been adopted in routine comparative surgery.

Congestion.—Every effort should be made to place the kidneys in a state of passivity by increasing the function of the skin and bowels. A full dose of aloin and calomel is advised at the commencement for horses and cattle; for the dog and cat, hydrargyrum cum creta, followed by small repeated doses of salicylic acid; or aspirin in the smaller animals. The local application of stimulating liniment or sinapis to the loins is also beneficial. If the pulse is full and bounding, blood-pressure of the kidneys may be considerably relieved in the horse by venesection. The body should be heavily clothed to induce diaphoresis.

The animal should be placed on a light laxative diet with demulcent drinks—barley water, linseed tea, hay tea, *ad lib.*—so that a free flushing of the kidneys is assured.

Inflammation.—Here, too, the kidneys must be placed in a state of rest as far as possible, and hyperactivity of the skin and bowels requisitioned, but in this condition calomel should not be given. After the bowels have been unloaded, the writer finds small doses of tincture of aconite combined with salicylate of soda, repeated often, gives best results in all animals. Pilocarpine may also be injected hypodermically. In the horse a fresh sheep-skin applied over the loins is most beneficial, while in the dog a mustard hip-bath and thorough drying afterwards is advised. When symptoms of uræmia set in, the system should be saturated with repeated doses of sodium citrate, and night and morning the administration of small doses of digitalis and sparteine is advocated. (See also Uræmia.)

In the dog, vomition in this stage is a distressing and lowering symptom, and every effort should be exercised to reduce this irritable phase by administering ingluvin, pepsin cum bismuth co., and sour buttermilk.

The diet in all animals must be light, digestible, and laxative. Drinking water should be allowed *ad lib.*, and demulcent drinks, such as linseed tea and barley gruel, are recommended.

When convalescence sets in, the patient is placed on a course of tonics—vegetable and mineral—and the diet should be of a nutritious nature: in the horse and ox, green foods and oats, bran, and linseed; in the dog and cat, mutton broth, chicken, fish, milk, Glaxo, cod-liver oil, and malt extract, etc.

KNUCKLING OVER.

Treatment for this condition depends largely upon the degree, and also on the extent of the disease which has brought it about. If the cause is due to a tendinitis with subsequent shrinking and of a recent origin, every effort should be made to reduce the inflammatory condition by placing the animal in a state of rest, administering a brisk purgative, applying hot fomentations and cooling lotion and thin linen packs down the sides of the tendons, more packs over these and around the whole limb, finally a thick flannel bandage. By these means, applied often, considerable reduction of the tendons will follow, and gentle stretching to break down adhesions should be practised. This is best done by placing a noose round the fetlock, bringing it down over the heel under the foot, and pulling the limb forward, while an assistant at the same time presses the knee in a downward and backward direction. This operation should be done daily, increasing the traction each time. When the animal begins to put his sole instead of the toe more evenly on the ground, a shoe thick at the toe and projecting 1 inch or more, according to the condition, and turned up to rest upon the front of the wall of the hoof, with thin, short heels, should be put on, and exercise ordered on the hard ground. If the improvement is maintained, a mild biniodide of mercury 1 : 12 ointment should be massaged into the tendons every three or four days, but on no account should a regular blister be applied at this stage.

If these efforts fail to bring about recovery, tenotomy is advised (which see).

Knuckling, although most commonly met with in practice as the result of strains brought about by overwork, is, however, occasionally seen in foals (congenital) and in young growing colts, in the latter usually due to mulnutrition or malformation, or both. In foals, the tendons being very elastic, considerable stretching takes place under pressure; but it may not be out of place here to give a note of warning, especially to the young practitioner, for if too much force is applied to the limb, fracture of a long bone at the epiphysis may take place; the pressure exerted, therefore, should be steady and gentle. After two or three days' stretching, according to the severity of the case, a leather splint should be put on and kept *in situ* with bandages; or a metal splint with a joint in it, so placed as to come opposite the fetlock-joint, may be made and placed on the anterior aspect of the leg, extending from the hoof to just under the knee, and kept in position by two or three straps. Needless to add, such a splint requires careful padding to prevent skin injuries.

Similar treatment may be carried out in older colts, with the addition of a long toe shoe.

Here, too, if these methods fail, tenotomy as a last resort should be tried. In all animals, if knuckling takes place in more than one limb it adds to the gravity of the prognosis.

LABOUR, ARTIFICIAL.

Where an animal has become paralyzed, where there is distinct evidence of pelvic deformity or obstruction interfering with easy delivery, where there is pronounced ventral hernia, or any other reason which the obstetrician considers inimical to the welfare of the expectant mother —artificial measures are called for to bring about labour and delivery. In the mare and the cow, the most satisfactory operation in practice consists of piercing the fœtal envelopes.

The instrument the writer uses is a long trocar and canula.

The lips of the vulva are washed with a solution of Lysol and the vaginal canal douched with an antiseptic. In the mare, a twitch is applied and the fore leg picked up; in the cow, a pair of bulldogs may be inserted in the nose. The instrument having been sterilized, the hands of the operator thoroughly disinfected, and the tail held aside by an assistant, the right hand is passed into the vagina and the os examined. In all probability it will be rigidly closed, but by rotating the index finger dilation may be secured. If excessive rigidity is encountered, smearing the os with extract of belladonna to which has been added a small quantity of boric acid, and waiting ten or fifteen minutes, will often facilitate the entrance of the finger. The os sufficiently dilated, the trocar and canula is carried into the vagina, the point passed through the os uteri and forced into the womb until it touches the fœtus, which is felt against the instrument as a hard substance. The trocar is then withdrawn and a quantity of the fœtal fluid drained away. Delivery in the mare usually follows within twenty-four hours, but in the cow it may be deferred two, three, or even four days.

The operation is a very simple one, and there is no danger to the animal provided rigid asepsis is carried out.

Other operations have been recommended to achieve the same end. Thus, some authorities advise the forcible entrance of the hand through the os into the womb; others suggest irrigating (continuous) the vagina with cold water. The writer prefers puncturing the envelopes to these, for the obvious reason that the operation is better surgery and the dangers of unfortunate sequelæ are infinitely less, and even *nil*.

LACHRYMAL GLAND CUM DUCT, DISEASES OF.

Dacryo-Adenitis.—Inflammation of the gland is usually seen in practice as the result of an injury. Irrigating the part with normal saline solution to which is added proflavine 1 : 2,000 will usually bring about resolution.

Dacryo-Cystitis.—Catarrhal inflammation of the lachrymal sac as a condition is usually secondary to nasal and conjunctival catarrh, or a sequel to influenza, strangles, distemper, or snuffles in the dog and cat. The sac usually being distended with accumulated fluid, finger pressure is brought to bear on that organ to evacuate the contents. The nasal opening of the lachrymal canal is then injected by means of a fine syringe with 1 : 2,000 proflavine or 1 : 500 boric acid. By this means the sac will refill, and is again emptied by pressure, the operation being repeated two or three times once or twice daily.

Stenosis of the lachrymal duct is occasionally seen in practice, the continual escape of tears down the face being a constant symptom. The writer has met four definite cases in horses. The condition is usually a sequel of catarrh of the gland, but one of the four cases was due to a small calculus, which was cut down upon and removed.

A small sterile sound or bougie or a fine dog's catheter, after being lubricated with salad oil, is passed up the canal from the nasal opening. If the instrument glides up too freely, a larger calibre instrument should be used, but more harm than good will follow if the instrument is too large and the force used too great. This danger must be guarded against. The operation should be repeated daily, using a larger calibre instrument each time.

LAMINITIS.

The majority of authorities consider the *cause* of so-called "fever in the feet" is exposure to cold, dietetic errors, mechanical effects of over-driving, parturition, and such-like, while the writer groups these as predisposing causes only, the actual cause being bacterial, amounting to an auto-intoxication, and in some cases, particularly in the parturient form, an auto-infection. The sooner these facts are recognized in practice, the more scientific and rational will be our line of treatment. The objects the practitioner should therefore have in view are to counteract the aggressive bacteria and eliminate and neutralize their free toxins. In the latter case, of course, the ideal procedure would be the immediate administration of a polyvalent antitoxic sera.

If the case is seen in the early stages and the blood-pressure is high, jugular bleeding until a good impression is made upon the pulse is called for, after which 4 to 8 pints of normal saline solution and 10 grains of proflavine should be injected subcutaneously, and the bowels unloaded by suitable aperients. For the horse the writer uses the following:

℞	Hydrargyri Subchloridi	grs. xxx.	Calomel
	Sodii Hyposulphitis	℥ii.	
	Sodii Chloridi	℥iii.	
	Theriacæ	O.i.	
	Aquæ	q.s.	

M. Ft. haust. To be repeated in twelve to fifteen hours if necessary.

A similar mixture is suitable for cattle, but double the quantum of treacle should be given. Where the bowels do not respond quickly, a hypodermic injection of pilocarpine is advised. In the meantime the patient should be placed on a course of antizymotics, β-naphthol, salicylic acid, boric acid, and turpentine, given in linseed gruel.

The laminal bloodvessels being in a state of distension, almost to bursting point, effusion or even extravasation must on no account be overlooked, but as far as possible warded against, our sheet-anchor here being adrenalin, injected on the inner and outer aspect of the leg or legs immediately over the plantar arteries, the dose being 1 c.c. of Parke, Davis's solution injected over each artery daily for three to six days. Such a procedure certainly checks organic complications inside the hoof, preventing that disagreeable condition "dropped sole." Some authorities also strongly recommend arecoline hydrobromide in $\frac{2}{3}$-grain doses subcutaneously. In the meantime the feet should be placed in hot poultices, or, better still, hot-water foot-baths; while at intervals, after the acute stage has been reduced, a rocking shoe should be put on and gentle exercise on soft ground ordered. In those cases of parturient laminitis the fountain of active infection is in the womb, and that organ must be energetically dealt with. Search must be made for retained pieces of placenta, these being carefully removed, if present, by traction. With a blunt-edged scoop the mucous membrane is lightly curetted and accumulated material removed by the hand. This completed, 2 drams of sodium chloride and 2 drams of sodium citrate are enclosed in the right hand and liberated in the basin of the womb. After allowing this to dissolve—two or three minutes—the mucous membrane, as far as possible, is lavaged with it by the hand (the hypertonic action of the salts increasing the uterine effusion), and a proflavine pessary inserted. This operation is repeated daily until the uterine organ has regained a more or less normal phase.

The writer strongly condemns uterine douches in these cases.

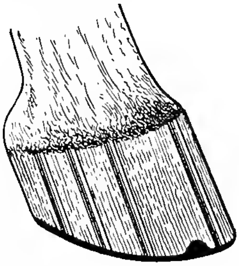

Fig. 86.—Operation Grooves made in the Wall of the Hoof to allow Expansion and relieve Vascular Tension.

If after a few days of treatment the lameness still remains excessive, and the practitioner suspects active effusion and consequent dropping of the pedal bone, he should immediately open the hoof by making four to six vertical incisions in the wall. The procedure the writer adopts is as follows: The foot is raised on a tripod and a groove made by the red-hot line-firing needle of the auto-cautery a little to one side of the mesial line of the hoof in front of and extending from the coronet to the toe. This groove is now widened and deepened until the sensitive lamina is nearly reached. A similar groove is made on the opposite side of the mesial line, and so on round the hoof, until in all four to six grooves are made. The hoof or hoofs should then be soaked in hot water and salt while Bier's treatment is being applied (see Fig. 86).

The diet should be sparing, light, sloppy, and digestible throughout.

After-treatment consists of blistering the coronets and in severe cases giving the animal a long run on soft marsh land grass.

LAMPAS.

Many practitioners advocate non-interference in these cases, but with this the writer does not agree, for great benefit has often been derived from operating on the gums to allow the escape of congested blood. By so doing a painful congestion is relieved; and if the operation is followed by a dose of physic, general blood-pressure is reduced and the animal improves in condition. Scarifying with the knife is a somewhat risky practice, however, owing to the danger of opening the palato-labial bloodvessels. To obviate this the writer snips off pieces of the gum mucosa with curved blunt-pointed scissors, after which a little common salt is rubbed into the wounds, thereby facilitating the egress of blood and the prolonged effusion of serum. The patient should be fed on sloppy bran for a day or two afterwards.

LAMZIEKTE, OR LOIN DISEASE.

A disorder of farm stock, shown recently by Theiler and others to be due to a state of toxæmia caused by the ingestion of a bacterial poison resident in decaying animal matter. Weakness of the loins and want of co-ordination of the hind limbs, with varying degrees of muscular weakness and paralysis, form the main clinical features of this disease, a disease which resembles in many of its features some form of toxæmia arising from vegetable poisoning or those diseases produced by certain ptomaines.

The specific organism which elaborates the toxin causing the disease is stated to be resident in the carcasses of decomposed animals lying exposed to the weather, in certain districts where the disease is epizootic.

Products of the decomposition of animal matter have long been recognized to contain highly poisonous substances—chiefly neuro-toxic in effect—a fact which has caused putrefactive blood and other such substances to be used in the production of arrow-head poisons, etc. Lucretia Borgia is reported to have recognized the poisonous properties, and made effective use of the putrid material obtained from the decomposing carcass of a pig. Such highly poisonous products are generally formed from protein material degraded by the action of certain anaerobic organisms, and the toxic product causing lamziekte would appear related to organisms of this type. The normal herbivorous animal shows no tendency to ingest organic material of a decomposed nature, and infection takes place only in the case of those animals which are suffering from a depraved appetite due to the absence or shortage of certain elements—phosphates, etc.—from the diet. In this sense lamziekte can be classed as a " deficiency disease."

Certain localities and farms, either too closely cropped or maintaining only poor and innutritious grasses, are apt to produce well-recognized disorders of the digestive and bony systems. Thus, a craving for salt and other normal chemical components of the diet is frequently successfully met by the use of "licks" consisting of bone meal compounded with salt, etc., and placed where such cattle can have constant access to the same. In this way the depraved state of the stomach with its frequent craving for the ingestion of old bones and putrid material is combated. This is the principle underlying the treatment of lamziekte —a rational principle which, by restoring a normal state of appetite, restores at the same time the normal revulsion to the ingestion of decomposed matter. In this way the specific infection of lamziekte is avoided.

Prophylaxis enjoins the removal—preferably by burial—of all animals dying on infected farms, and the liberal use of salt and bone dust wherever a tendency to depraved appetite is noticed among the stock grazing on infected areas.—*H. Watkins Pitchford.*

LAPAROTOMY.

Opening into the abdominal cavity, either with the view of exploring or operating upon an abdominal organ, is known as laparotomy, and as such is a comparatively simple operation, and, further, if due sterile precautions are taken, remarkably safe. The ox may be operated upon standing if the flank route is chosen; the horse and the smaller animals are, however, best placed in the recumbent position.

Where circumstances permit, the alimentary canal should be emptied by fasting, laxatives, and enemas. In the horse and ox the flank is the usual seat of operation, and unless the rumen is the organ to be operated on, the right flank is preferred to the left, while in the smaller animals the mesial site is to be preferred. The patient anæsthetized if cast, the skin is shaved and scrubbed with tincture of iodine or iodized benzol, and secured on his side for the flank, and his back for the mesial operation. The skin having been incised, the muscular elements are cut through, leaking bloodvessels twisted as they are encountered, and lastly the peritoneum is incised. The next step now depends upon the objective for the operation; these will be found treated under their respective heads. The operation completed, the peritoneum is sutured with fine silk, the surfaces being brought together. The muscles are then sutured —interrupted sutures—with strong catgut or silk, and lastly the skin. The wound is then covered with boric collodion and a sterile pad of cotton-wool applied, which is kept in position by an abdominal bandage. If there is evidence later of pus being present, a suture may be removed, and a sterile drainage tube inserted and fixed by sutures to the skin, while proflavine irrigations are carried out. In the case of the horse the patient should be tied up short to prevent it lying down for some days, and in all animals rigid quietude in hygienic surroundings, with low laxative diet, are indicated for a week or ten days at least.

LARYNGEAL HEMIPLEGIA. *See* **Roaring.**

LARYNX, DISEASES OF.

Catarrh.—This condition may be mild or severe, simple or specific, complicated or uncomplicated. The patient should be placed in a roomy, well-ventilated box, in the case of the horse and ox, and the body suitably clothed. If it is contagious, isolation, of course, is advisable. As there is usually difficulty in swallowing, the forcible administration of medicines is to be deprecated or carried out with extreme care, but salines may be allowed in cold drinking water. Electuaries successfully take the place of draughts, these having both a local and systemic effect.

For the horse and ox :

℞	Acidi Borici Extracti Belladonnæ Foliorum	āā ℥i.
	Potassii Chloratis	℥ii.
	Theriacæ	ad q.s.

M. Ft. electuar. One large teaspoonful placed on tongue and molars every two or three hours.

When the temperature is high, salicylic acid may be substituted for boric acid. Where the case is a severe one, the writer invariably begins by placing on the tongue 1 dram of calomel and ½ dram of aloin. There is no drug which possesses such a specific action on low throat affections as calomel.

In the dog : 1 to 3 grains—according to size—of hydrargyrum cum creta should be placed on the tongue, followed by—

℞	Acidi Borici Potassii Chloratis Vin. Ipecacuanhæ	āā ʒi.
	Aquæ Chloroformi	q.s. ad ℥iv.

M. Ft. mist. One to two teaspoonfuls three times a day.

A mustard plaster should be applied to the throat in all classes of patients. Musterole makes a nice stimulating emollient in the dog, and if necessary the inhalation of medicated steam, such as eucalyptus, terebene, creosote, menthol, and benzoin. In obstinate cases where progress is slow, considerable relief is gained by spraying:

℞ Acidi Carbolici	ʒi.
Glycerini Boracis	℥v.
Aquæ Rosæ	ad ℥xx.

Or a 7½ per cent. menthol solution in medicinal paraffin may be used.

The diet in all cases must be light and digestible.

Croup.—Here the great danger to life is due to lodgment of detached false membrane in the respiratory tract (*i.e.*, rima glottis), in which case tracheotomy must be immediately performed. In animals that vomit, an emetic should be given; and if it is impossible to administer it *per oram*, a hypodermic injection of apomorphine is advised. The inhalation of carbolic vapour or bacteriol is also called for, further treatment being carried out on the lines advised for catarrh.

Œdema of the Glottis.—Where the symptoms are alarming, tracheotomy must be performed at once. In milder cases mustard and vinegar well massaged into the laryngeal region often hastens recovery. In all animals, painting the affected area with tannic acid 1 part, glycerine 8 parts, two or three times a day, has given the writer good results, or a spray of adrenalin 1:2,000 may be tried. A brisk purgative, where it can be administered, is also advised after the distressing stage has passed. Iron and quinine in large doses in these cases, if seen early, appear to act almost as a specific.

Spasm.—If threatening suffocation exists, tracheotomy is called for. In milder cases the hypodermic injection of morphia et atropine often gives great and sudden relief. Here also a brisk purgative should be given when the acute stage has passed.

Tumours.—Growths in the region of the larynx are most commonly seen in the ox and occasionally in the horse, the symptoms produced ranging from a slight stertor to almost suffocation, oral breathing, and difficulty in swallowing.

The region should be examined by inserting a mouth gag and exploring the part with the hand (see Fig. 87). If the tumour is pedunculated, it may be removed by force, a snare or the chain of the ecraseur passed round it. If it is sessile, hard, and fibrous, it should be deeply cut into, for it is just possible that in the centre there is a purulent cavity, which, if evacuated, will give at least temporary relief, subsequent treatment being similar to the next condition to be described. If the growth is a distended pus cavity, lancing evacuates a large mass of purulent material, and the relief after the animal has coughed up all the debris is immediate. The patient should then be placed on a course of biniodide of mercury 10 grains and chloride of sodium 4 drams, given night and morning on the tongue, and, in the case of the ox, fattened for the butcher. With a pair of bulldogs fixed in the nose cattle can usually be operated on standing; bulls, however, by reason of the strength of their neck and their less docile disposition to restraint, should be cast. Quiet horses may also be treated standing, but, if resistant, they should be cast. Where an animal is being operated upon in the recumbent position, the poll should be raised by a sand or straw bag, to prevent the pus entering the trachea.

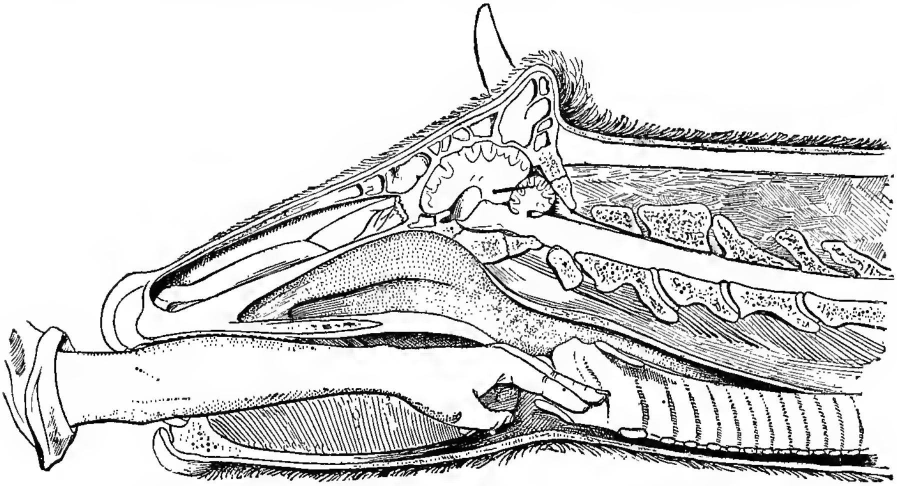

FIG. 87.—DIGITAL EXAMINATION OF THE LARYNX. (Moussu and Dollar.)

LEUCÆMIA.

Treatment is unsatisfactory, but good food, hygiene, and a course of arsenic, iron, potassium iodide, and quinine, may be tried.

In man benzol has been used with success. The dose for horse and ox, 1 to 3 drams; for dog, 5 to 8 minims.

LEUCOMA. *See* **Opacity, Corneal.**

LEUCORRHŒA.

The so-called term "whites" has been applied to this condition. It is most commonly seen in cows, but the mare is not immune. Leucorrhœa is symptomatic of a chronic catarrhal condition of the vaginal mucosa; extension may, however, take place to the cervix, and even to the uterine mucosa itself. Before treatment can be undertaken satisfactorily, the practitioner must therefore ascertain to what extent the disease has reached. This is best done by using a vaginal speculum and an electric lamp. If the os is pervious the point should be noted, and so also the presence of ulcers on the cervix or on the vaginal mucosa.

As this is a debilitating disease, where the practitioner is not usually called in until the condition is well advanced, he generally finds his patient in a poor and unthrifty condition. This state of affairs, to give the patient a better chance to battle with the disease, must be altered by allowing an abundance of rich, nutritious food and administering a course of tonics, constitutional and uterine. The following is advised for cow and mare:

℞ Damianæ	℥ss.
Ferri Sulphatis	ʒii.
Nucis Vomicæ	ʒi.
Sodii Chloridi	℥i.

M. Ft. pulv. One powder to be given night and morning in food or in draught.

It is very important that the bowels are regulated by occasional doses of treacle. Local treatment consists of administering vaginal douches daily, the best agent for this being sulphate of zinc, but there is no reason why the practitioner should bind himself to one antiseptic; on the contrary, there is every reason why he should change the douche occasionally, more especially if the case "hangs fire." The following are a few douches which have given the writer satisfactory results:

℞ Zinci Sulphatis	ʒii.
Aquæ	ad O.iv.

Or—

℞ Zinci Sulphatis	ʒii.
Sodii chloridi Sodii Citras	āā ʒiv.
Aquæ	ad O.iv.

Or—

℞ Proflavine	grs. xx.
Sodii Chloridi Sodii Citras	āā ʒiv.
Aquæ	ad O.iv.

Or—

℞ Zinci Sulphocarbolatis	ʒi.
Hydrogen Peroxidi	℥vi.
Aquæ	q.s. ad O.iv.

It is very important that the douche should be 5° to 8° F., about the normal body temperature. This is especially important in the case of those douches where chloride or citrate of sodium is used. Where ulceration is present, each ulcer must be touched with a strong astringent lotion through the vaginal speculum every few days until resolution sets in. The best agent for this purpose is nitrate of silver, 30 grains to the ounce of water, the ulcer being painted with a long camel-hair brush. It is also advisable at the same time to touch *lightly* thc reddened mucosa which surrounds the ulcer. The most obstinate cases met with in practice, however, are those where extension has taken place deeply into the uterus, culminating in a case almost amounting to pyometra.

In the majority of these cases the uterine wall has lost its contractility and become a loose, flabby organ, making no effort to assert itself. To douche such an organ is worse than useless. If the os is only slightly open, it should be enlarged first by smearing with belladonna ointment; and, second—after ten minutes' waiting—stretching the neck by rotating with the fingers of the right hand, cone-shaped. An entrance having been gained to the womb, the mucosa is lightly curetted with a metal spoon, after which most of the debris is scooped out by the hand. A tampon soaked in a solution of picric acid is now carried into the uterus, and as much of the mucosa as can be reached swabbed. This operation should be repeated by two or three fresh tampons. A daily swabbing is indicated until the discharge has almost ceased and the womb has recoiled. Where the uterus tends to remain flabby, the daily injection of pituitrin for ten days or a fortnight is advised.

Vaccine Therapy.—In addition to the foregoing treatment, in all obstinate cases auto-vaccination should be carried out. In the writer's hands, cases that have defied the usual treatment, exhausting the patience of practitioner and client alike, have responded to vaccination admirably. The bacteria present are usually those of mixed infections, the principal being streptococci, *Staphylococci albus*, occasionally *B. coli* and diphtheroids.

The dose of vaccine must be large, and much increased with each injection until a very full dosage has been reached. Further, better therapeutical results are obtained from attenuated and later virulent antigens than from sterile vaccines.

LICE. *See* **Parasitic Diseases.**

LIGHTNING STROKE.

Treatment must be regulated according to the manifest symptoms. If the animal is down and unable to stand, it should be propped on its breast by sand or straw bags, an aperient administered, a mustard plaster rubbed into the loins, and a course of strychnine or nux vomica and potassium nitrate administered. If it is semi-unconscious, diffusible stimulants are indicated—ammonia, coffee, camphor, alcohol, etc. Hypodermic injections of strychnine, caffeine, digitalin, veratrine, along with normal saline transfusions, may also hasten recovery.

LIPS, DISEASES OF.

Cheilitis.—Inflammation of the lips is due to injuries, irritant poisons, stings, and certain specific bacterial diseases. The nature of the condition having been ascertained, the cause should be removed, as far as this is possible. After a laxative aperient has been given, an antiseptic astringent is applied, such as alum or boric lotion or a weak solution of potassium permanganate. Where there is much œdema, hot fomentation with normal saline solution and scarification is indicated. Should the lips, consequent upon the inflammatory deposit, remain indurated, painting occasionally with tincture of iodine is advised. If the skin remains cracked and sore, an emollient ointment should be applied.

In all cases the patient should be maintained on sloppy food or liquids, and where prehension is in abeyance artificial feeding is called for.

There is a contagious inflammatory condition in young lambs, occasionally met in practice combined with stomatitis, which takes on a highly fatal form. The healthy should be separated from the diseased, and both moved to fresh pastures. Locally the lips should be dressed with permanganate of potash, boric acid, or proflavine solutions.

Epithelioma.—Most commonly occurs in the horse and dog. Immediate surgical removal is here demanded and complete extirpation carried out, not only of the neoplasm, but its roots also, the edges of the resultant wound brought together with sterile sutures, and the whole covered with collodion.

Paralysis.—This condition may be partial or complete. In complete paralysis of the lower lip, there is a considerable tendency to œdema, in which case scarification, with the application of white lotion and the suspension of the organ in a net spread over the lips and nose and fixed with straps to the poll, is necessary. Systematic massage of the lips and the application of stimulating liniment or blisters over both cheeks may also hasten resolution. If the condition is partial, restoration often takes place without treatment. In all cases, however, the animal should be placed on a sloppy, laxative diet. Where other structures are involved, and where the origin of the paralysis originates in a cerebral centre, treatment is useless.

Warts.—A very common seat for warts, especially in young horses, are the lips. These warts may be very small and numerous or large and few. In the former case, the daily application of a *saturated* solution of washing soda often effects a cure; failing this, pure acetic acid or salicylic acid dissolved in collodion. Where they are large and single, removal with the knife is indicated and the wounds dressed with an antiseptic, but *not* with coal-tar preparations, owing to the latter activating malignant tendencies, and in some cases neglected warts culminate in carcinoma.

LITHOTOMY. *See* Calculi.

LIVER, DISEASES OF.

Abscess.—When this condition is diagnosed during life, a course of vaccines is advised derived from all the pus-producing organisms and made as polyvalent as possible, while the system should be saturated with sulphide or lactate of calcium. In the smaller animals, there is no reason why laparotomy should not be performed and the abscess cleared up surgically.

Actinomycosis.—When this disease is diagnosed or suspected and treatment is considered economically sound, a course of vaccination and saturating the system with biniodide of mercury and potassium iodide are indicated, combined with an abundance of rich, good food.

Cirrhosis.—The source of irritation should be removed where detected. In the case of injurious foods, grasses, chemicals, these should be excluded. If due to parasitic causes, their expulsion is called for. The patient should then be placed upon a course of biniodide of mercury, potassium iodide, sodium bicarbonate, with occasional laxative aperients, and non-stimulating dietary ordered.

Coccidiosis.—See Parasitic Diseases.

Congestion.—There are two forms seen in practice—passive and active. The former is brought about by valvular disease of the heart (see also Heart Disease). The latter is due largely to irregularity or errors of diet, to correct which is the first line of treatment, a non-stimulating diet being essential throughout. For horses, cattle, and sheep, grass, bran mashes, and hay, with roots, maize, and cakes, meals being withheld, while an abundance of fresh water and more exercise is essential. Medicinally the horse should receive a purgative of aloin and calomel, the ox and sheep sodium sulphate and treacle, the pig and dog calomel, while later in all animals alterative doses of calomel and sodium bicarbonate are most beneficial, or the patient may be put on nitro-hydrochloric acid and infusion of quassia. Ammonium chloride is also a useful agent, and so also is ipecacuanha, as hepatic stimulants. In the smaller animals, massage over the hepatic region is an excellent stimulant, or a mustard plaster may be applied in all patients.

Cysticercosis.—See Parasitic Diseases.

Distomatosis.—See Parasitic Diseases.

Echinococcosis.—See Parasitic Diseases.

Inflammation.—If the animal is in much pain, a sedative is indicated, the additional treatment being practically on the same lines as congestion.

Rupture.—If the injury to the organ is slight, probably it will not be diagnosed during life; if it is pronounced, it will most likely end fatally. The line of treatment, if adopted, should be that for, first, shock; secondly, hæmorrhage (which see); while in the smaller animals surgical measures may be adopted.

LOCAL ANÆSTHESIA. *See* **Anæsthesia.**

LOCKJAW. *See* **Tetanus.**

LUMBAR PUNCTURE.

This operation, initiated in human surgery, is occasionally performed in the lower animals, usually with the object of injecting an anæsthetic or tapping the spinal membranes to relieve pressure consequent upon an over-accumulation of fluid. In the horse, ox, and dog, the site chosen is a point equidistant between the two internal angles of the ilium. The trocar used in the larger animals is about 6 inches long, and $\frac{1}{8}$ to $\frac{1}{16}$ inch in calibre. If the patient is a horse, a twitch is firmly applied and the head thrust upwards, the operator standing on a box on the near side. In the case of the cow, it should be firmly held by a pair of bulldogs.

The instrument, and also the skin at the seat of operation, having been thoroughly sterilized, the trocar and canula is thrust downwards in a perpendicular direction, penetrating the lumbo-sacral space. On approaching this space, it will be found that the instrument slips more easily; proof that it has entered the neural canal is obtained on removing the trocar by the escape of fluid through the canula. The operation is performed more easily in cattle than in horses, the space being larger in the former. The principle of operation on the dog is similar to that of the larger animals, but of course the instrument is considerably smaller, and the patient should be fixed on the operating table on its sternum. If the object of the operation is anæsthesia, a sterile solution of cocaine is injected with a sterile syringe through the canula—30 to 60 minims of a 2 per cent. solution for horse and ox, 4 to 10 minims for the dog; novocaine (5 per cent. solution), 60 to 90 minims for horse and ox, 10 to 20 minims for the dog.

In from five to ten minutes after injection anæsthesia is produced in the posterior portion of the body; the horse or ox, rocking from side to side, eventually lies down and rolls on to its side. If the case is one of spinitis and there is evidence of fluid pressure, as soon as the instrument reaches the canal the fluid flows out under pressure, varying in degree according to the quantity present. The writer has performed lumbar puncture for spinal effusion in thirty-eight cases in cattle and four in horses, some of which derived considerable benefit; if ordinary sterile precautions are taken, no fear of unsatisfactory results need follow. Out of the forty-two lumbar punctures made in the horse and ox, no unsatisfactory sequelæ have been noted, neither at the time of operation nor subsequently.

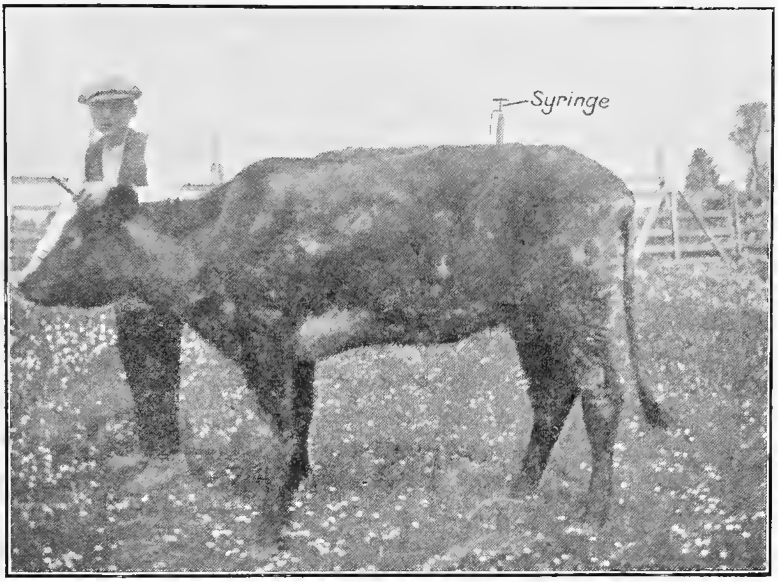

Fig. 88.—Lumbar Puncture in the Cow.
The syringe *in situ* indicates site of operation.

LYMPHATIC SYSTEM, DISEASES OF.

Lymphadenitis.—Inflammation of the lymphatic glands is due to the effects of irritants passing through them, and these mainly of bacterial origin. The starting-point may be in the system itself, or it may arise from an abrasion of the skin and a poisoned wound, or the inoculation of poisonous insects and reptiles, the predisposing factor in most cases being a lowered vital resistance of the general economy.

In all cases, treatment must be energetic and carried out as early as possible. If it is due to wound infection, thorough cleansing and lavage with mild antiseptics is called for. If the infective germs are anaerobes or suspected anaerobes, oxidizing agents such as hydrogen peroxide and permanganate of potash, as irrigants, are indicated. Where the wound is a punctured one, it should be laid open and the walls freely curetted. In all cases, the flow of lymph through the wound is urgently called for by the free use of lymphagogues, internally and externally, such as sodium citrate and sodium chloride, while hot fomentations applied to the part increase the local blood-flow, and hence the bactericidal serum.

Bier's treatment in suitable cases also proves an excellent adjuvant. An aperient dose of medicine should be given in the early stages; and if the temperature is high, febrifuges such as salicylic acid, quinine, aspirin, and liquor ammonia acetate, are indicated. In severe cases, a bacterial examination of the wound should be made, and suitable antisera injected, followed later by autogenous vaccines.

The patient should be placed in healthy surroundings, and a nutritious and laxative diet ordered.

Lymphadenoma.—Treatment here, like leucæmia, is not very satisfactory, but an extended course of arsenic and iron or the hypophosphites and potassium iodide may be tried. Good rich food and hygienic surroundings are essential.

Lymphangiectasis.—Dilatation of the lymphatic vessels is most commonly seen in old horses subject to repeated attacks of *simple* lymphangitis, and is primarily due to blocking of the flow of lymph in the vessel consequent upon obstruction. Treatment consists of applying, where possible, elastic bandages from the foot to as high up the limb as is practicable, or the repeated application of biniodide of mercury blisters, and an extended run at grass. Occasional doses of physic, followed by a course of biniodide of mercury or potassium iodide, may also be tried.

Lymphangitis, Simple.—This is a common condition, affecting full-blooded, plethoric, gross-feeding horses. When the case is seen early, the patient breathing heavily, the heart's action laboured, bleeding from the jugular is indicated, and a smart purgative administered. Moderate exercise should be ordered and diuretics given in drinking water. If the temperature is high and the animal is in much pain, tincture of aconite and potassium nitrate or salicylic acid should be given night and morning. In chronic cases, an elastic compress should be applied to the leg (see Bier's Treatment) or a blister rubbed in, and the animal turned out to grass, and a course of potassium iodide and iron may be tried.

[**Lymphangitis Epizootica.**—Incise buds and "dress with powerful antiseptics such as perchloride of mercury in methylated spirit (1 in 250)" (E. Wallis Hoare).

In advanced cases, extirpate whole of diseased tissue or use the thermo-cautery under an anæsthetic.

Internal treatment has not had marked success, but preparations of arsenic, mercury, and iodine may be tried. All diseased animals should be strictly isolated and the vacated premises, fittings, harness, and utensils disinfected. All dressings must be carefully destroyed. The lesions should be protected from the attacks of flies, and animals should be prevented from biting and rubbing the affected parts.

In the case of " an imported animal " (Law), and " under all circumstances where facilities for the thorough isolation or treatment of cases do not exist, immediate destruction is to be recommended" (E. Wallis Hoare).—*G. K. Walker.*]

MAGGOTS (SHEEP). *See also* Parasitic Diseases.

At certain seasons of the year, and in some seasons more than in others, maggots in sheep become very troublesome to flock-owners, and if their ravages are neglected serious loss may follow. All maggots should be mechanically removed from the wound, and any weak solution of a coal-tar preparation applied once or twice daily.

When the wool is matted, it should be removed with the shears.

As a preventive, shepherds use fly-powder dressings dusted into the wool; these are largely composed of flowers of sulphur.

Where extensive wounds exist as a result of the maggots burrowing, arsenical dipping should be deferred until these have healed.

MALLANDERS AND SALLANDERS.

The administration of a full dose of aloes at the commencement is always advisable. All dirt and debris lodged in and on the irritable area should be removed by washing with hot water, soap, and soda. The parts are then dried and an astringent antiseptic lotion, such as lotio alb. cum liquor carbonis detergens, applied night and morning. It is advisable to keep the diseased area as dry as possible, and of course the animal should not be worked, especially if the roads are muddy. When the skin becomes dry and crusted, an emollient ointment is advised, such as boric and iodoform ointment. In obstinate cases a course of arsenic, iron, and potassium nitrate, in food night and morning is recommended. Bran, roots, and green food should enter largely into the dietary.

MALIGNANT APHTHA (SHEEP).

The bacillus necrosis in this disease in some outbreaks appears to develop a very aggressive form, and, being contagious, the diseased should be separated from the healthy, both being removed to fresh pastures. The writer has found that a 1 per cent. ointment of proflavine applied to the sores on the lips and legs gives excellent results. Many authorities recommend peroxide of hydrogen, permanganate of potash, boric acid solutions, or coal-tar preparations. When the animal seems feverish, a course of salines should be administered; if the lips are so extensively diseased as to interfere with prehension, sloppy trough foods should be ordered.

MALIGNANT CATARRH. *See* Catarrh.

MALIGNANT JAUNDICE (DOG). *See also* Icterus.

It appears this disease is due to a piroplasm, and Nuttall and Hadwen have obtained gratifying results from the injection of trypan blue, the dose being 5 c.c. of a 2 per cent. solution for a dog up to 20 pounds, subcutaneously injected, and for larger dogs proportionately more. It may be necessary to repeat the injection in ten days (Montgomery).

MALIGNANT ŒDEMA.

This is a highly fatal infection. It is seen in deep-seated injuries contaminated with soil; it sometimes follows castration, especially in sheep, and it is not uncommonly seen in cows after difficult parturition where dirty ropes and instruments have been used. The organism being anaerobic, superficial wounds are not so likely to become infected as deep ones. Unless the patient is seen early, treatment is of little avail, the organisms running riot and a generalized poisoning taking place.

The organism's pathogenic activities are assisted by the presence of secondary bacteria such as the *V. septique*, *B. Welchii*, streptococci, staphylococci.

Treatment, to be of any avail, must be heroic and energetic: deep lancing, scarifying and irrigating the affected area with peroxide of hydrogen, permanganate of potash solutions, or oxygen water.

If the affection proceeds from a limb, Bier's treatment may be applied with advantage, or a tight bandage may be wound round the wound from the foot upwards, producing anæmia of the part, which should be maintained for ten to fifteen minutes, when it is removed, hyperæmia following, the operation being repeated two or three times a day.

An antitoxic serum may now be obtained derived from horses made hyperimmune by the injection of *B. œdematicus*, *B. Welchii*, *V. septique.* But here also to be of any use the serum must be injected early and repeated often. Further treatment consists of the intravenous injection of normal saline solution, and sustaining the heart's action by the administration of ammonia and the hypodermic injection of strychnine, camphor, digitalin, caffeine.

MALLEIN.

This specific antigen was discovered by Kålning and Helman in 1891. It is prepared by growing the *B. mallei* for an extended period—about four weeks—on or in nutrient media. The growth in the former is then washed off and sterilized by heat, and the solution filtered through a Chamberland or other filter; to the filtrate, glycerine and carbolic acid are added. Mallein is therefore composed of the endo- and oxo-toxins of the glanders bacillus.

Mallein has proved itself to be an almost infallible diagnostic for glanders in the horse. There are different methods adopted for using mallein:

Subcutaneous Test.—If 1 to 2 c.c. are injected into a glandered horse, a specific local and thermic reaction takes place—in other words, a clinical hypersensitive phase develops, which, if properly interpreted, is a most valuable aid to diagnosis.

The thermic rise usually begins from six to eight hours after injection, and may go on for twenty-four to thirty hours. When it has reached the maximum, a gradual fall usually takes place. There may also be constitutional disturbance—*i.e.*, tremors, depression, loss of appetite. In addition, there is a local swelling at the seat of inoculation, which gradually increases up to twenty-four to thirty hours or more. A typical swelling is hot, painful on pressure, with raised border, and possessing a diameter of 3 to 6 inches or more.

Hunting gives the following as typical reactions—thermic and local:

	Temperature.	*Diameter of Local Swelling.*
At 8 p.m. (time of injection),	100° F.	
,, 8 a.m. (12 hours after injection),[*]	104° F.	3 inches
,, 12 noon (16 ,, ,, ,,),	105° F.	4 ,,
,, 4 p.m. (20 ,, ,, ,,),	105° F.	5 ,,
,, 8 p.m. (24 ,, ,, ,,),	104° F.	6 ,,

---

[*] The writer considers it advisable, however, to commence taking the temperature at the *ninth* hour after injection.

Of course, it is hardly necessary to point out that the above ideal reaction does not always occur in practice. Thus, one may find a pronounced local reaction and a faint thermic rise, or *vice versa*. Where a temperature is under 103° F. and a local swelling less than 4 inches in diameter, the case should be looked upon as doubtful, and re-tested in a month with a slightly larger dose. The thermic reaction cannot be safely estimated when the pre-injection temperature is over 102·5° F. (Hunting). Where negative results are obtained, the animal may be safely certified to be non-glandered. Mules, in the writer's experience, require double the dose given to horses; probably this is due to the fact that the bacilli used in the manufacture of the antigen is derived from the *horse*. The ideal mallein for the mule, therefore, should be derived from a mule source.

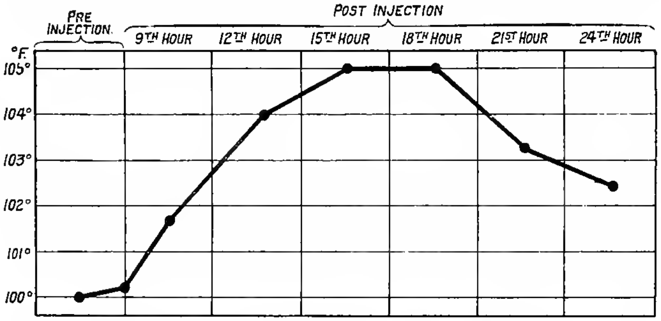

FIG. 89.—A TYPICAL MALLEIN THERMIC REACTION.

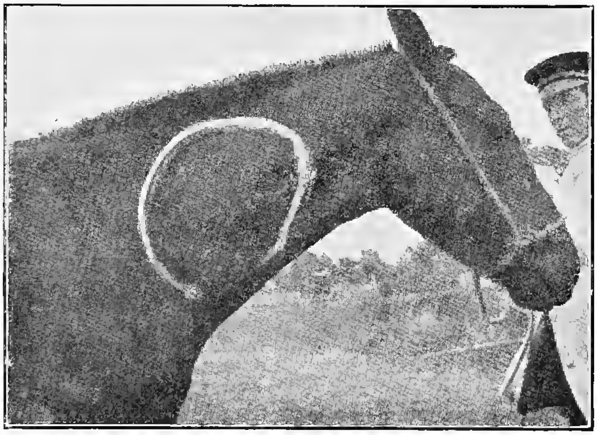

FIG. 90.—A TYPICAL SWELLING FOLLOWING SUBCUTANEOUS INJECTION OF MALLEIN, EXTENDING FROM THE JUGULAR FURROW TO THE MANE.
The chalk line indicates the boundary.

Ophthalmic Test.—This consists of dropping, with an eye-dropper, into the inner canthus of the eye 2 or 3 drops of specially prepared mallein. From four to six hours after application in a glandered horse a local reaction is noted consisting of an acute conjunctivitis characterized by redness, swelling of the eyelids, which are intermittently closed and opened, and a mucopurulent and, later, purulent discharge which is found running from the inner canthus and adhering to the skin somewhat like candle grease. This discharge may be maintained for twenty-four to thirty-six hours. It may be necessary to point out, however, owing to the irritation set up, that the animal is liable to rub the eye against a fixed object, and, in doing so, to remove the characteristic discharge—a possible factor which, if not taken into consideration, may be misleading to the clinician.

Parke, Davis and Co. supply discs for the same purpose. The lower eyelid is everted and the disc inserted with the index finger or a small moistened brush.

Intradermo-Palpebral Test.—This method has of recent years come into great favour, and has been extensively used during, and since, the war. Discovered by a French veterinary surgeon, and introduced by Hobday into this country, the writer had opportunities of proving its efficacy on many thousand mules.

Two to three minims of mallein are injected *into the skin* of the upper or lower eyelid—preferably the latter—by a very fine needle. In a glandered animal the lid becomes œdematous, accompanied by a catarrhal discharge and conjunctivitis. The reaction begins about seven to ten hours after injection, and is at its height about the twenty-fourth hour. In some cases the reaction may last for three or four days. The advantages of the ophthalmic and intradermal tests over the subcutaneous are: (1) Where a large number of animals are to be injected, a saving of mallein is obvious; (2) where the temperature is high, barring the subcutaneous test, these other tests may be proceeded with; (3) temperature registrations are not necessary, and in large studs a great saving of time is obtained.

MALNUTRITION.

Before corrective treatment is adopted, endeavours should be made to ascertain the cause. Thus, if the teeth are at fault, mastication cannot be satisfactorily performed, throwing upon the digestive system greater strain, which in young growing animals may be more than they can stand.

Digestion may be defective, producing poverty of the blood, which in itself weakens digestion through a sufficiency of good blood not being supplied to the gastric glands, which consequently cannot secrete a sufficiently rich gastric juice; the hepatic system, incapable of producing enough bile, retards digestion, facilitates intestinal auto-intoxication, with consequent systemic poisoning and malnutrition; intestinal parasites, disturbing digestion and absorbing the nutrient ingesta; nephritic affections, preventing the kidneys from eliminating metabolic poisons in the usual way, or, on the contrary, allowing to pass valuable nutrient elements, such as sugar and albumen. Recent modern thought has been directed to vitamins, and a dietary defective in these has been proved to be productive of malnutrition.

When treating a case of malnutrition, it is usually sound practice to begin by giving an aperient, or even a purgative; by so doing the eliminative organs are flushed, blood-pressure is stabilized, and lodged toxins got rid of. The system should then be toned up by such agents as iron, strychnine, arsenic, gentian, cinchona, calumba, quassia infusion, and nitrohydrochloric acid, aromatic sulphuric acid, etc.

In dogs a useful agent is the compound syrup of hypophosphites.

The diet in all cases should be liberal. In the larger animals, bran, oats, cake, the various meals, matured roots, good herbage, and treacle. In the dog and cat, brown bread, oatmeal, milk, Glaxo, rice, minced meat, fish, chicken, tripe, Angier's Emulsion, Scott's Emulsion, cod-liver oil, and malt extract. Messrs. Parke, Davis and Co. have placed a compound vitamin on the market which is called Metagen, and although it is somewhat early to speak with authority on its therapeutical value, experimental results appear so far to be satisfactory in cases of malnutrition.

MAMMARY GLAND, DISEASES OF.

Of all the domestic animals to suffer from derangements and diseases of the mammary gland, the cow is the greatest victim, and for the obvious reason that that organ in the bovine species has been so abnormally developed through man's desire to increase milk production that an essentially artificial state has been reached, out of all proportion to Nature's intention. When an organ is overworked it falls an easy victim to bacterial invasion, and when one remembers the anatomical structure of the udder with its physiological function, one recognizes at once in that organ an ideal bacterial incubator. In their desire to explain how pathogenic bacteria reach the udder, pathologists, supported by clinicians, largely agree that the avenue is through the teat. With this view the writer is at variance in the vast majority of cases. A large proportion of the cases of mastitis seen in practice is due in the first instance to careless milking—*i.e.*, not stripping the quarters absolutely clean at each milking.

Milk left in the udder for a considerable period undergoes change; the saprophytic organisms present in the udder mucosæ, as on other mucosæ of the body, tend to become parasitic, owing to the local debilitating influence of the retained abnormal milk, and once their pathogenic function is established their progressive development is rapid, the clinical data being largely in proportion to their virulence. A *thorough* milker, therefore, is a valuable prophylactic asset so far as mastitis is concerned. Another condition commonly seen in practice is noted when cows are "dry" running at grass, and develop acute mastitis in one or more quarters. This may be due to the gland for some reason becoming active; the milk stagnates, and, should saprophytes be present, mastitis follows; or the animal may be "housing" pathogenic bacteria which find themselves carried by the blood or lymph stream to the stagnant and abnormal milk, and there find the necessary medium for them to take on the aggressive rôle. There are other cases, however, where pathogenic bacteria "housed" in some distant organ of the body break through into the lymph or blood stream, or both reach the udder and set up pathological changes. Retention of the placenta, metritis, pyometra, and such-like diseases, are often the forerunners of mastitis. The defensive mechanism breaking down, the bacteria reach the blood or lymph stream, eventually reaching the udder. Bacterial infections of the respiratory and alimentary systems are also conducive to mastitis, in the writer's opinion.

Finally, as stated, it cannot be denied that pathogenic organisms in some few instances gain access to the udder through the teat and set up disease.

Congestion.—Probably most commonly seen in primiparæ, the mare, cow, bitch, and sow are all subject to the condition, but it is as a rule amenable to simple treatment. A saline aperient having been administered, the udder is milked often, hot fomentations are applied, and astringent cooling lotions rubbed in; this routine is usually effectual; camphorated oil well massaged into the udder is also a useful agent. When œdema exists in excess, painting the cutis with tincture of iodine and superficial lancing with a sterile knife in several places relieves tension and hastens absorption.

Cysts.—Galactophorous cysts are not very common in the lower animals, and, when present, operative treatment is usually called for. The cyst having been widely opened at the most dependent point, its wall is curetted and the cavity packed with gauze soaked in equal parts of oil of turpentine and olive oil. This dressing, after remaining *in situ* for forty-eight hours, should be removed, the after-treatment consisting of daily irrigation with a mild antiseptic.

Mastitis.—Whatever may be the exciting cause of this disease, the actual one is bacterial infection, and the arrest of their growth with the removal of their products must ever be the primary object of the practitioner. When one remembers the structure of the mamma, it will at once be seen this is not always an easy matter. When pathogenic bacteria invade the udder they are provided with an ideal incubator. The milk coagulates by decomposition of the lactose and the production of acid. The leucocytes arrive in great numbers; many of these, with the epithelial cells, at the onslaught undergo cloudy swelling and die, victims of the bacteria and their toxins. The acini become gorged with bacteria and are soon walled in by cellular hyperactivity. If the infection is counterbalanced by a well-developed protective body mechanism, constitutional disturbance may be slight, while the local damage may only amount to a slight hypertrophy of the parenchymatous structures of the udder, with temporary or permanent suspension of its secretory function. This may be defined as subacute mastitis. Where the bacterial invasion is very virulent, with the consequent more or less complete annihilation of the protective mechanism, acute mastitis with all the systemic and local phenomena is noted. Lastly, where the bacteria run riot, completely paralyzing the protective forces and setting up a vicious circle, moist gangrene follows, constituting gangrenous mastitis. It will therefore be evident from what has been already stated that no case of mastitis should be treated in a perfunctory manner, but rather every measure should be applied from the outset to bring the organ back to normal. Many and varied are the means advocated for this purpose.

Constitutional Treatment.—An elevated temperature is an index of toxin absorption, and the higher the thermic rise, the greater, as a rule, is the toxic charge. This must be got rid of as quickly as possible, and if the animal is in good condition, with a *full pulse*, bleeding from the jugular has given the writer good results. This should be followed by a subcutaneous injection of normal saline solution. The eliminative organs—the bowels, kidneys, and skin—should be well flushed by allowing the patient an abundance of water, and, if need be, creating thirst by placing salt on the tongue. A purgative in the early stages is always advised: for the mare, aloin and calomel; the cow and ewe, sodium sulphate, calomel, and treacle; the sow, sodium sulphate; the bitch, a calomel pill. Diuretics consist of turpentine, liquor ammonia acetate, potassium nitrate, potassium chlorate, æther nitrate spirit. Diaphoretics are salicylic acid, salicylate of soda, sponging the body, and, in smaller animals, hot baths. Needless to add, clothing the body facilitates diaphoresis.

In addition to the foregoing, in some cases pronounced cardiac symptoms show themselves, due to the toxins; these must be treated with such agents as alcohol, ammonia, digitalis, caffeine or coffee, strychnine.

The diet in all cases should be sloppy, light, and digestible, and the strength maintained with gruels, eggs, milk, etc. When convalescence sets in, the patient should be placed on a course of tonics, vegetable and mineral.

Local treatment must always remain an important factor in the curative rôle, involving close attention to detail.

Local Treatment.—Fomentation applied repeatedly for a considerable time tends to reduce tension and increases leucocytosis. Suspending the udder by means of a bandage support passed over the loins also gives relief. Stripping the affected quarter or quarters every hour or two helps to eliminate bacteria, toxins, and peptonized debris. In some cases, however, it may be impossible even after massaging the gland to remove any secretion, owing to the teat canal becoming blocked with casein. In such cases, particularly if the patient is showing symptoms of auto-intoxication or auto-infection, the teat or teats should be amputated close to the base. By so doing, a large quantum of toxic effete material is drained away, and it is far better to sacrifice a teat and a quarter than the life of a patient. After fomentation a compound liniment should be rubbed into the quarters. The writer has found the following most useful:

℞ Linimenti Camphoræ Ammoniati
Linimenti Belladonnæ .. āā ℥ii.
Liquoris Plumbi Subacetatis Dil.
Linimenti Saponis .. .. q.s. ad O.ii.
M. Ft. lini. To be gently rubbed into the udder after each fomentation.

In addition, the writer has found very good results by compressing the milk vein in front of the udder as it passes along the abdominal wall—a modification of Bier's treatment—by means of a flat piece of stick fixed by a cord passing round the abdomen and lightly tied over the loins. This should be left *in situ* for fifteen to thirty minutes, and repeated two or three times a day.

Irrigation of the affected quarter or quarters with suitable antiseptics is also an important adjuvant, but care must be taken to choose those which do not coagulate milk. After trying very many, the writer now confines himself to the following: Proflavine, 1:3,000, or boric acid, 1:1,000, combined with sodium citrate, 1:250, and sodium carbonate, 1:200, dissolved in *boiled* normal saline solution. From 10 to 20 ounces may be injected into each quarter once or twice daily, the udder well kneaded, and after fifteen to twenty minutes the quarter to be milked clean. This may be alternated by the injection of hydrogen peroxide, 2 ounces, normal saline solution, 10 ounces.

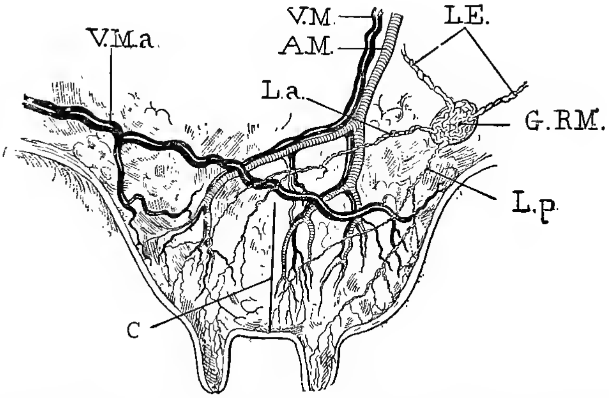

FIG. 91.—SCHEME SHOWING STRUCTURE AND ORGANIZATION OF THE UDDER: ANTERO-POSTERIOR SECTION, SHOWING THE ARRANGEMENTS OF THE ANTERIOR AND POSTERIOR QUARTERS AND THE TEATS, SKIN, TRANSVERSE PARTITIONS, ETC.

G.R.M., Retro-mammary lymph gland; *L.p.*, lymphatics of the posterior quarter; *L.a.*, lymphatics of the anterior quarter; *L.E.*, efferent lymphatics; *A.M.*, mammary artery; *V.M.*, mammary vein; *V.M.a.*, anterior mammary vein (subcutaneous abdominal vein); *C.*, transverse intermammary septum.

(Moussu and Dollar.)

In spite of all medicinal effort, should resolution not take place in the gland, suppuration, progressive hypertrophy of the parenchyma, or even moist gangrene (commonly seen in cows and ewes), may develop, or the patient may die from toxæmia or bacteræmia before these retrogressive stages are reached. Where an abscess is detected, lancing, evacuating the pus, and irrigating the cavity, is essential. Where hypertrophy and induration is the ultimate ending of the inflammatory process, medicinal effort is usually unsuccessful in restoring the normal functioning of the gland, but the patient may be put on a course of potassium iodide or biniodide of mercury, and a mild biniodide of mercury blister, 1 : 12, occasionally rubbed into the udder.

Amputation.—When gangrene develops, immediate removal of the diseased organ is called for. It is most imperative that this operation should be performed before the animal becomes exhausted, and before the system is overcharged with toxins and bacteria.

If the condition is seen early and the gangrene is of a circumscribed character, the animal is cast and chloroformed, the area painted with iodine, and a free and deep incision made into the centre of the dead zone, each dead portion in turn being dissected on either side of the central incision, the bloodvessels being ligatured or twisted, according to their importance, as they are encountered. The cavity is then smeared with B.I.P.P., packed with gauze, and sutured and redressed daily. In those cases where it is necessary to remove the whole mamma, the anterior mammary vein or veins are ligatured and a circular incision of an elliptical kind is made in the skin near the base of the udder, and drawn backwards. The udder is then scooped out with the fingers and blunt-pointed bistoury, bloodvessels ligatured as they are encountered. When one-half or two-thirds of the organ has been dissected in this way, it should be twisted on itself two or three times, untwisted, and retwisted again in the opposite direction, the object being to stretch the adherent tissues until the gland is hanging by a pedicle. Round this a stout sterile ligature is very firmly applied, which includes the main bloodvessels, and the organ

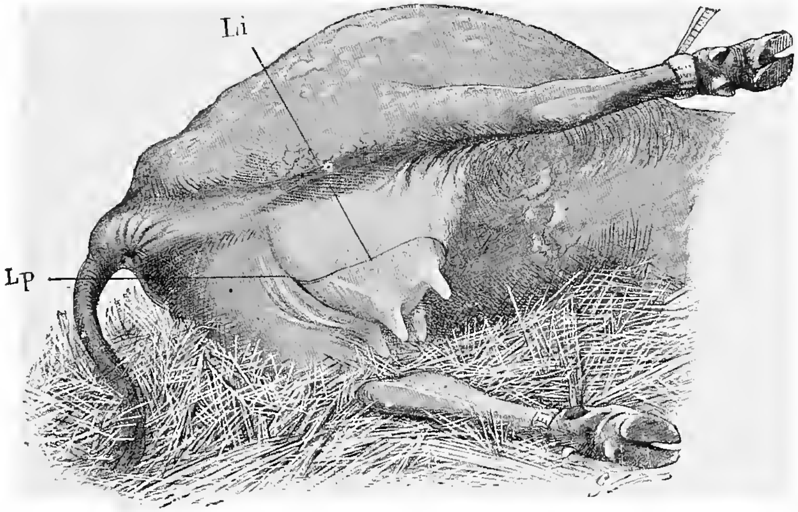

FIG. 92.—AMPUTATION OF THE QUARTERS OF THE MAMMARY GLAND, SHOWING LINE OF INCISION. (Moussu and Dollar.)

removed by the ecraseur, the chain of which, of course, is fixed between the ligature and the gland. The whole cavity is now dusted with equal parts of boric acid, iodoform, and cretæ preparatæ, packed firmly with gauze, over which the skin is tightly sutured. In forty-eight hours the major portion of the sutures are removed, the gauze is withdrawn, and the cavity irrigated night and morning with proflavine and normal saline solution for at least a week or ten days, after which less attention is necessary. Subsequent to the operation the animal's bedding should be perfectly clean, and after a few days gentle exercise is necessary to prevent undue cutaneous contraction.

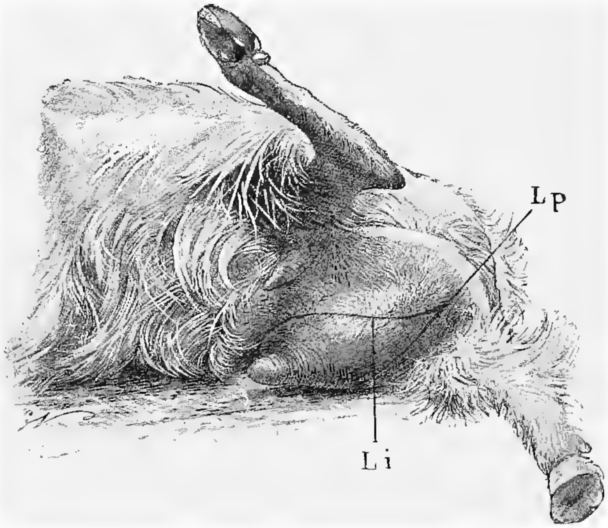

Fig. 93.—Amputation of One Quarter of the Mammary Gland, showing Line of Incision. (Moussu and Dollar.)

Auto-Vaccination—*Curative.*—Whether the case is a single, simple, sporadic one, or whether a number of animals are affected, the first step of importance consists in ascertaining the type of organism or organisms which are responsible for the disease. With this object in view, smears should be made from the udder secretion and the bacteria present noted.

From time to time these smears, if a large number are examined from different parts of the country, demonstrate to the mind of the microscopist that morbid milk harbours a large variety of bacteria—some pathogenic, some non-pathogenic; some virulent, some non-virulent. It cannot be too strongly impressed on the reader that in taking *materiès* from the udder for cultural purposes, it is necessary to exercise extreme care to prevent alien contamination. After painting the nipple of the teat with tincture of iodine, a quantity of the secretion should be milked out before a collection is made. The collecting vial, along with the cork, *must* be sterile, and for preference it should be sealed with paraffin wax and *immediately* dispatched to the vaccine therapist.

The most common aggressive pathogenic organisms the writer finds in practice are:

Streptococcus pyogenes.
Staphylococcus albus and *S. aureus.*
B. coli.
B. enteritidis.

In addition to these, there are, of course, tubercle bacilli, actinomyces, botryomyces in isolated cases.

In all cases of mastitis it is clear that the natural immunizing forces of the body have broken down, the organisms have housed themselves in the udder, and disease is the result. The function of the vaccine therapist is to raise the immunizing index of his patient; this is brought about by vaccination, *active* or *passive*, or both. Where there is evidence of toxæmia or bacteræmia, *passive* immunization by the daily injection of a rich hyperimmune serum is indicated, but before this means can be scientifically applied a correct understanding as to the type of organism or organisms must be ascertained, not only from the udder content itself, but also from the blood-stream when it is invaded; for it is obvious, if an antistreptococcal serum is injected, and staphylococci and *B. coli*, for example, are present also, the maximum benefit of passive immunity cannot be obtained by this means, nor should it be expected. Failure, therefore, at the outset spells disaster all along the line, bringing the treatment into disrepute. And as with serums, so also with vaccines; but where autogenous vaccines are used, no danger on this score need follow.

When the disease is running an acute course, the writer always advises the immediate injection of a polyvalent mixed vaccine preparatory to making an autogenous one, the dosage being largely dependent upon the acuteness of the disease and the stamina of the patient; but it is always sound policy to begin with too small rather than with too large a dose, gradually increasing as indications arise. The usual period between the injections which the writer finds works out best in practice is four to six days. A course of six doses may assist in bringing about resolution, but in obstinate cases a further course may be necessary. In these cases, however, it is always advisable to make another microscopical examination of the udder contents before supplying a second course, for one sometimes finds that one or more of the original types of organisms have disappeared to the advantage of the others, which may or may not be original, but supplemental. Where the mamma is extensively diseased and organic mischief has developed to an advanced degree, it is impossible in the majority of cases to anticipate that vaccine therapy is going to restore the organ to a normal state again—that is entirely the work of Nature, and she may, but more often does not, succeed.*

Prophylactic.—The greatest benefits, therefore, to be derived from vaccine therapy are (1) its life-saving properties, (2) its prophylactic properties. The first has been briefly touched upon, the second will now be discussed. When one or two cases occur yearly in a dairy, some simple element is in existence, although by reason of its simplicity it may be difficult to locate; but where a large number of cows are affected, quite another condition of affairs becomes manifest. The origin may be a freshly introduced cow acting the part of carrier, or the " dairy " may be partaking of food richly contaminated with the right type of organism. Such a condition of affairs calls for drastic action, for it must be at once obvious as an economic proposition that the prevention of mastitis and its sequelæ is more profitable than its cure. Having isolated the healthy from the affected, a bacteriological examination of the milk and blood of the latter is made and the causal organisms noted. From these a vaccine is procured, each healthy animal having three doses injected once a week. The first dose should be sterile, the second attenuated, and the third virulent.

Prevention.—Even a single case of mastitis in a dairy should be looked upon with suspicion and isolated from its fellows immediately, and milked by an independent milker. When a number of animals are affected, they should be separated from the herd and separate milkers supplied, who before and after milking must wash thoroughly in disinfectants. The surroundings should be made as hygienic as possible, and the floors, etc., daily swilled with strong disinfectants. Following the doctrine that dirt harbours bacteria, the udders should be washed before each milking, and so also the hands of the milker; in short, the disinfectant pail should be as much in evidence in every dairy as the milking pail.

If the cows are in poor condition, richer food should be ordered, for it is a *sine qua non* that an animal in low condition is more liable to become a victim to bacterial infection than one in good physical form.

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* In some cases the writer has obtained good results by administering to the animal its own infected milk—a form of auto-vaccination.

As the predisposing cause is often climatic, housing in bad weather (particularly wet weather, accompanied with cold east winds) is essential. Again, the writer believes that certain pasture-lands, especially permanent pastures, are predisposing, if not actual factors, and he has helped to cut short an epidemic of mastitis in these cases by change of pasture, particularly to high ground.

Upon no account should the milk from an affected cow be milked on the ground, but rather it should be milked into a special bucket, mixed with strong disinfectant, and put down the drain.

In the writer's experience, there is a close relation between metritis, retained placenta, etc., and mastitis. As a prophylactic measure, therefore, these cases should be removed from the dairy and carefully treated, according to the nature of the case. Finally, as has been already pointed out, vaccination of the healthy when the disease has broken out is a most valuable preventive weapon, and should be more universally carried out in practice.

Stenosis of the Mammary Duct.—Obstruction to the flow of milk may be due to a variety of causes. The normal pervious canal may be nothing more than a solid fibrous cord, in which case treatment is of no avail. An impervious membrane may be thrown across the entrance of the duct, which should be pierced with a sterile probe, and the operation repeated if necessary.

The most common cause of stenosis in cows, however, is the presence of papillomata growing from the membrane of the duct. These may be single or, very occasionally, multiple. One or more teats may be affected, their presence being felt by manipulating the teat between the finger and thumb. The obstruction may be complete or partial; in the latter case a slight flow of milk is obtained.

These growths appear to form with comparative rapidity and without apparent cause, the usual history being that when the cow is "let up" for calving the milk flow is normal, but when she is milked after calving the condition is detected. In removing these growths, it is most important to bear in mind that too much force should not be used, for unnecessary injury to the canal produces a condition as bad as it was before the operation. The patient is held firmly by a pair of bulldogs inserted in the nose, and the hind legs "spanned" below and above the hocks, the tail being included in the span to prevent lashing. The point of the teat is painted with tincture of iodine and grasped with the left hand, while a papillotome, carefully sterilized, is passed into the canal till the point reaches the obstruction. The teat is now drawn downward, the object being to stretch the canal so that when the growth is pierced with the instrument it will not be so likely to go through the wall of the duct. The index finger of the left hand is now made to form a ring round the teat over the growth and firmly compressed, while the right hand rotates the instrument, in the process of which the growth is removed. The writer always uses two sizes of papillotomes, the one with the smaller calibre, of course, being used first.

After the operation there is always a certain amount of hæmorrhage, but on milking the quarter " dry " this usually stops. There is a tendency for these papillomata to recur, or constriction of the duct at the seat of operation may follow.* To obviate this, an antiseptic astringent bougie should be inserted immediately after the operation, and repeated after each milking for five to seven days. If the attendant is called upon to do this, he should be carefully instructed to wash his hands in disinfectant, to smear the bougie in fresh boric ointment, to wash the nipple of the teat, and then paint with tincture of iodine before insertion. It is only by precautions such as these that mastitis can be prevented.

Instead of a papillotome a teat bistoury may be used, this being a matter for the operator's taste.

Some authorities advocate the removal of these growths by operating through the teat wall. This method, the writer must confess, has never appealed to him, and for obvious reasons.

Occasionally one comes across cases where the canal is perfectly normal but small in calibre, taxing the patience of the milker. Stretching the duct with various sized siphons or using proper teat dilators is here indicated, but these instruments must be sterilized before using, and so also the entrance to the teat.

Tumours, Mammary.—These are most commonly seen in the bitch and sow, occasionally in the mare and cow. They may be simple or malignant, single or multiple. Malignant neoplasms are sarcoma, carcinoma, epithelioma, enchondroma, etc. In the case of simple tumours or cysts, palliative measures may be adopted by placing the patient on a course of iodide of potassium and iron, and painting tincture of iodine on the growth, and, in the case of the latter, lancing and evacuating the contents. Malignant neoplasms, if circumscribed, should be removed surgically and as early as possible, under an anæsthetic. The skin over the seat of operation, having been thoroughly washed, is painted with tincture of iodine or iodized petrol, and an elliptical incision made near the base of the tumour. If the growth is somewhat floating—and it usually is—digital surgery and a blunt-pointed bistoury reduces hæmorrhage to a minimum. In those cases where such dissection cannot take place and the knife must be used, important bloodvessels are ligatured or twisted as they are encountered. When the tumour has been sufficiently dissected to allow it to rotate on its own axis, it should be twisted, a ligature lightly applied close to the abdominal wall, and either removed by the knife or ecraseur, the cavity dressed with an antiseptic and the skin sutured, the after-treatment being that for an ordinary wound.* In those cases where the whole mamma is involved, complete removal of the udder is called for (see Amputation of the Mammary Gland).

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* In some cases a recurrence takes place, when a second and even a third operation is called for.

Warts.—These are very troublesome, especially in the cow, as they interfere with milking. If they are small and multiple, washing them daily with a saturated solution of washing soda sometimes effects their removal; to reduce the irritation set up in the process of milking, they should be smeared with boric ointment prior to milking. Where they are large, their removal surgically is indicated.

MANE AND TAIL ECZEMA.

This condition is most commonly seen in warm weather, and affecting horses running at grass. In Somerset it is called "sweet itch." As the result of the irritation set up, they rub themselves against posts, trees, or any fixed object, and the hair of the mane and tail disappears. The condition is troublesome to cure. The patient must be kept indoors and prevented from rubbing as much as possible. A dose of physic should be administered and a course of iron and arsenic prescribed. The skin of the mane and tail having been thoroughly washed with hot water, soda, and soap, the following is rubbed in daily:

℞	Sulphuris Præcipitati Zinci Oxidi Potassii Carbonatis	āā ℥iii.
	Liquoris Carbonis Detergens	℥ii.
	Saponis Mollis	q.s. ad O.ii.

M. Ft. lini. To be rubbed in daily.

If this treatment does not bring about relief, the application every ten or twelve days of biniodide of mercury ointment, 1 : 10, is recommended.

MANGE. *See* Parasitic Diseases.

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* Where after removal a recurrence takes place and it is desired to prolong the patient's life, ovariotomy should be performed, which, while exercising a retarding influence over the normal physiological functions of the mamma, tends to check the pathological progress also.

MASSAGE.

Massage will never be used so extensively in comparative as it is in human medicine. In the latter it has been reduced to a specialized fine art. Nevertheless, in suitable cases it might be used more often in veterinary practice than it is, and it is with the idea of stimulating the art among veterinary surgeons that the writer gives this article in descriptive detail.

Effleurage consists of gentle stroking or rolling of the skin, increasing to moderate friction directed centripetally. Each stroke commences at the most distant point under treatment, the up-stroke being firm, while the down-stroke is light, and as many as 100 strokes may be carried out per minute.

Pétrissage is a kneading movement, and is applicable to muscles mainly. The skin and muscles are grasped between the operator's fingers, which are tightened and loosened, commencing at the periphery and extending to the centre. One or both hands may be used.

Tapotement consists of a series of blows struck by the flat or the edge of the hand. This is especially useful in dealing with soft œdematous elements.

Friction consists in rubbing small circles from the periphery and using the whole hand or finger-tips, and is used in treating joints, tendons, etc.

Vibration consists of a combination of the two preceding movements with a vibratory movement added. There are also mechanical vibrators, which are usually worked by electricity, the effects upon the parts being trophic, stimulating, and soothing.

General Massage.—In the smaller animals this may be carried out with comparative success, although in the coarse-haired dogs it is by no means satisfactory. To undertake massaging a horse all over is no light task, but with willing assistance it is by no means impossible. The extremities are massaged one at a time, and, of course, commencing at the foot and working upwards. The chest may be treated with effleurage and tapotement, the effects upon the respiratory muscles, pleura, and lungs being that of a tonic and stimulant. It is probable that abdominal massage carries the greatest therapeutical value, especially in the smaller animals, and least of all in the horse, owing to the thick and unimpressionable abdominal tunic. In those animals with a flexible abdominal wall, kneading can, however, be very successfully carried out.

Massage may be carried out in a variety of diseases. In thickened tendons consequent upon inflammatory exudate, the whole tendon should be kneaded between the fingers and thumb from below upwards, the foot being raised from the ground and the knee or hock flexed. This should be followed by effleurage, after which a layer of cotton-wool is placed along the hollow on either side of the tendon, the whole limb bandaged, and the patient ordered gentle exercise. The operation should be repeated once or twice daily.

In the case of œdematous swellings, massage tones the circulation, stimulates the absorbents, and hastens a return to the normal. All forms of massage may be here successfully applied. In subacute and chronic diseases of the mammary gland, massage makes an excellent adjuvant to other forms of treatment, but here as a rule it is advisable to use a bland emollient to prevent irritation of the sensitive skin, goose grease being a very usual and favourite one.

Abdominal massage is useful in cases of stoppage and constipation in the dog, pig, and cat; also in indigestion and intestinal atony. In the ox and horse the writer has seen the action of purgatives hastened by placing a plank under the abdomen with an attendant at each end, who raise the plank against the abdomen as far as it will go, then suddenly drop it, allowing the abdominal contents to fall rapidly, thereby producing almost all the forms of visceral massage in one effort. In cattle the rumen may be successfully kneaded (pétrissage) or successive blows applied (tapotement) to rouse the neuro-muscular elements. It is therefore useful in impaction and tympany. The bowels may also be massaged: in the smaller animals, through the abdominal wall between the fingers and thumb; in the larger animals, through the rectum.

Finally, massage proves useful in muscular atony and atrophy carried out along the lines indicated above.

MASTICATORY PARALYSIS.

Where the condition is due to injury of the nerves which regulate the action of the masticatory muscles, the local inflammation should be reduced by hot fomentation and the application of cooling lotion, while the administration of a purgative is always advised. If the origin of the condition is in the brain, however, treatment is usually hopeless, and destruction is the soundest policy.

When curative measures are attempted, the patient will require artificial feeding, either by injecting sloppy nutrient far back into the mouth or using a stomach tube, or by the administration of nutrient enemas. Locally galvanism may be tried, or a smart biniodide of mercury blister may be rubbed into each cheek and temple, while the patient may be placed under a course of nux vomica, potassium iodide, and ferri sulphate. In the dog, Easton's Syrup is useful. Some cases respond to treatment very well, while others will be found to "hang fire" and tax the patience of everyone concerned. It may be pointed out, however, that as time goes on the patient educates itself to suck up liquid nutrient, which is a considerable point gained. When improvement does not follow within a month, the patient should be destroyed.

MEDICINAL AGENTS.

Acacia.—The mucilage is occasionally used in the treatment of shock and hæmorrhage. It is administered intravenously, dissolved in normal saline solution at a strength of 6 per cent. It is dissolved by boiling for twenty minutes. For the horse, 4 to 8 pints may be injected; and for the dog, 10 to 20 ounces, according to size.

Adrenalin.—Adrenalin chloride solution is composed of 1 part adrenalin chloride and 5 parts of chloretone in 1,000 parts of normal saline solution. It is a powerful vaso-constrictor, hence it is much used as a local styptic and for internal hæmorrhage. It is also serviceable in raising the blood-pressure. It is administered hypodermically as a rule, but more immediate effects are obtained by injecting intravenously; great care, however, is required, and it must be injected very slowly, well diluted in saline solution.

The dose hypodermically for horse and ox, 1 to 2 drams; for sheep and pig, 10 to 15 minims; for dog, 2 to 6 minims.

Aloes.—This drug is used largely in the horse as a purgative, occasionally in cattle, combined with Epsom or Glauber's salts and ginger, or the derivative aloin may be given. In small doses aloes is a vegetable bitter and tonic, an hepatic stimulant and a vermifuge.

The purgative dose of aloes for the horse is 4 to 7 drams; ox, 1 to 2 ounces; sheep and pig, 2 to 3 drams; dog, 10 to 20 grains. Aloin: Horse, 1 to 2 drams; ox, 2 to 3 drams; sheep and pig, 10 to 20 grains; dog, 3 to 6 grains. As a vegetable tonic, one-tenth of the above doses may be safely administered.

Alum.—Administered internally it acts as an astringent, and is therefore useful in diarrhœa and dysentery. It is said to act beneficially in laminitis (Mayell), and has been prescribed for internal cancers in man. Applied locally it is an astringent, caustic, and slight styptic. It is used as a mouth wash, gargle, nasal douche, with normal saline solution.

Dose: Horse and ox, 1 to 3 drams; sheep and pig, 10 to 20 grains; dog, 3 to 7 grains.

Ammonia—*Ammonii Carbonas.*—A diffusible stimulant, antispasmodic, stomachic.

Dose: Horse and ox, 2 to 8 drams; sheep and pig, 15 to 30 grains; dog, 3 to 5 grains.

Spiritus Ammoniæ Aromaticus.—A diffusible general stimulant, antispasmodic, expectorant, antacid.

Dose: Horse and ox, 1 to 2 ounces; sheep and pig, 30 to 90 minims; dog, 10 to 30 minims.

Liquor Ammonii Acetatis.—A diaphoretic, diuretic, expectorant, antipyretic.

Dose: Horse and ox, 2 to 4 ounces; sheep and pig, 3 to 6 drams; dog, 1 to 4 drams.

All ammonia preparations are useful in continued fevers, colic, cardiac depression, bronchial catarrhs, etc.

Amyl Nitris.—Is not often used in comparative medicine. It is a peripheral vaso-dilator, and is useful in high blood-pressure; relieves spasm, especially of the bronchial muscles, in which case inhalation is the best method of administration. It is also serviceable in the spasms seen in angina pectoris.

Anisi Fructus.—Powdered aniseed is used principally as a carminative, antispasmodic, and flavouring aromatic agent.

Dose: Horse and ox, 1 to 2 ounces; sheep and pig, 1 to 4 drams.

Antifebrin—*Acetanilidum.*—Antipyretic, analgesic, diuretic. It is used in continued specific fevers, such as influenza.

Dose: Horse and ox, 1 to 4 drams; sheep and pig, 20 to 60 grains; dog, 2 to 8 grains.

Antimonium—*Ammonium Tartaratum* (*Tartar Emetic*).—Expectorant, alterative, vermicide, febrifuge, diaphoretic. It is also given intravenously in saline solution for blood parasites (bilharzia).

Dose *per os :* Horse and ox, 1 to 2 drams; sheep and pig, 10 to 20 grains; dog, 2 to 5 grains.

In animals which vomit it is a valuable emetic. Dose: Sheep and pig, 8 to 10 grains; dog, 1 to 3 grains.

Antipyrine.—Antipyretic, antiseptic, analgesic. It is useful in all fevers, but, being very incompatible, it is invariably given alone.

Dose: Horse and ox, 2 to 4 drams; sheep and pig, 20 to 60 grains; dog, 3 to 10 grains.

Aphrodine.—A powerful aphrodisiac; is employed in impotence in the male and sterility in the female.

Dose: Stallions and bulls: 1 to $1\frac{1}{2}$ grains; dog $\frac{1}{500}$ to $\frac{1}{50}$ grain.

Apomorphinæ Hydrochloridum.—An expectorant, hypnotic, emetic. In practice it is principally used as a canine emetic.

Dose: Dog, $\frac{1}{30}$ to $\frac{1}{10}$ grain; hypodermically as an emetic.

Aquæ—*Aqua Aurantii Floris.*—Made by pouring boiling water over orange peel, and is useful for flavouring medicines.

Aqua Camphoræ.—Prepared as follows: Camphor, 15 grains; alcohol, 1 ounce; water, 30 ounces.

Aqua Chloroformi.—Chloroform, 1 dram; distilled water, 40 ounces.

Aqua Menthi Piperitæ (*Peppermint Water*).—Oil of peppermint, 1 dram; water, 125 ounces.

Arsenic.—An alterative tonic. It is useful in debility and anæmia. In chronic pulmonary conditions it is serviceable as a respiratory tonic. It is often prescribed in chronic skin diseases.

Dose: Horse and ox, 5 to 10 grains; sheep and pig, $\frac{1}{2}$ to 2 grains; dog, $\frac{1}{80}$ to $\frac{1}{30}$ grain.

Liquor Arsenicalis.—Dose: Horse and ox, $\frac{1}{2}$ to 1 ounce; sheep and pig, 10 to 20 minims; dog, 2 to 10 minims.

Sodii Cacodylas.—This salt of arsenic is hæmatonic, stimulant, protozoacide, and may be given *per oram*, *per rectum*, hypodermically, intravenously.

Dose *per oram:* Horse and ox, 15 to 30 grains; sheep and pig, 2 to 3 grains; dog, $\frac{1}{8}$ to $\frac{1}{2}$ grain. For subcutaneous and intravenous injection sterile ampoules are supplied by Parke, Davis and Co. in their proper doses.

Atoxyl.—This is an organic compound which contains 22·8 per cent. of arsenic. It is not so toxic as the inorganic salt. It has been prescribed for the destruction of blood parasites.

Dose: Horse and ox, 15 to 20 grains; sheep and pig, 2 to 3 grains; dog, $\frac{1}{4}$ to 1 grain. It is also sometimes given intramuscularly; dissolves in water in one-quarter to one-half the above doses.

The antidotes for arsenical poisoning will be found under Poisons.

Atropine—*Atropinæ Sulphas.*—This alkaloid of belladonna is usually administered hypodermically, and combined with morphia enhances and prolongs the sedative action of that agent. It is useful in spasm of the involuntary muscles, such as colic, in inflammatory conditions of vital organs, and acute diseases of the eye, especially where dilatation of the pupil is required.

Dose (hypodermic): Horse and ox, $\frac{1}{4}$ to $\frac{1}{2}$ grain; sheep and pig, $\frac{1}{100}$ to $\frac{1}{50}$ grain; dog, $\frac{1}{250}$ to $\frac{1}{100}$ grain.

Belladonna—*Extractum Belladonnæ Viride.*—This drug is useful in all inflammatory conditions affecting the internal organs, while for external use it forms an important anodyne liniment.

Dose: Horse and dog, 1 to 3 drams; sheep and pig, 10 to 20 grains; dog, $\frac{1}{2}$ to 3 grains.

For antidotes, see Poisons.

Beta-Naphthol.—A powerful internal and external antiseptic. It is serviceable in diarrhœa due to *B. coli* infection, and in alimentary fermentation. As an ointment it is used in bacterial and parasitic skin affections.

Dose *per oram:* Horse and ox, 1 to 2 drams; sheep and pig, 15 to 25 grains; dog, 2 to 8 grains.

For ointments the strength is 1: 8.

Bismuth—*Bismuthi Carbonas*, *Bismuthi Salicylas*, *Bismuthi Subnitras.*—These three salts are very valuable gastro-intestinal sedatives, antiseptics, and astringents, the salicylate being the most astringent, the subnitrate the most antiseptic, and the carbonate the most sedative. They are all, therefore, useful in gastro-intestinal catarrh and inflammation.

Dose: Horse and ox, 4 to 6 drams; sheep and pig, 30 to 40 grains; dog, 5 to 15 grains.

Boric Acid.—Boracic acid is mainly used as an antiseptic for dressing wounds, surgical material, etc. It is also an intestinal antiseptic, and as it is excreted slowly it is useful in kidney and bladder bacterial infections. It is a cumulative drug.

Dose: Horse and ox, 1 to 4 drams; sheep and pig, 20 to 30 grains; dog, 5 to 10 grains.

Boric ointment (strength 1: 8) is useful for general wound treatment.

Boroglyceride (strength, 1 boric acid, 3 glycerine) is a useful antiseptic, and can be freely diluted with water to make an antiseptic lotion suitable for irrigations or sprays.

Bromides—*Salts of Ammonium*, *Potassium*, *Sodium.*—These are all powerful nerve sedatives, hypnotics, and soporifics; hence they are useful in nervous affections such as tetanus, chorea, convulsions, eclampsia, epilepsy.

Dose: Horse and ox, 1 to 2 ounces; sheep and ox, 30 to 90 grains; dog, 5 to 15 grains.

Caffeine.—The citrate is the form usually prescribed. Caffeine is a stimulant, acting through the nervous system. It is prescribed hypodermically in heart weakness or failure, in shock and collapse.

Calcium.—Precipitated chalk, prepared chalk, lime water, calcium lactate, are the most common lime preparations. Their principal functions are antacids, gastro-intestinal astringents, and sedatives; lime salts also raise the calcium content of the blood, thereby acting remotely as styptics.

Dose: Horse and ox, 2 to 4 ounces; sheep and pig, 1 to 6 drams; dog, 10 to 60 grains. Lime water: Horse and ox, 10 to 20 ounces; sheep and pig, 1 to 3 ounces; dog, 4 to 8 drams.

Camphor.—This is a valuable hypnotic, antispasmodic, anodyne, expectorant, and carminative. It is useful as a gastro-intestinal sedative and antifermentive, acting beneficially in diarrhœa, dysentery, and tympany. It relieves catarrh and congestion of the respiratory mucosæ, and is prescribed in coughs and bronchitis. As a nerve sedative, it is given in epilepsy and convulsions combined with bromides.

Dose: Horse and ox, 1 to 2 drams; sheep and pig, 15 to 30 grains; dog, 1 to 6 grains.

Linimentum Camphoræ.—Made by adding 20 per cent. camphor to olive oil. The intramuscular injection of camphor oil (1 part camphor, 5 parts sterile olive oil) is practised in those cases of great cardiac depression following distemper, influenza, strangles, puerpera, septicæmia, etc.

Dose: Horse and ox, 2 to 4 drams; sheep and pig, 30 to 40 minims; dog, 8 to 12 minims. The injections may be repeated at different situations night and morning. If given subcutaneously, an indurated nodule is liable to occur at the seat of injection.

Cannabis Indica.—Indian hemp is occasionally prescribed in equine intestinal cases as an anodyne, sedative, and narcotic, but its action does not appear to supersede other agents of a similar class.

Dose: Horse, 4 to 8 drams.

Cantharides.—A Spanish fly is used as a blistering agent, the active principle being cantharidin. The powdered fly is mixed with vaseline or lard to form a blistering ointment, the usual strength being 1: 6 or 1: 8. The action can be increased by adding glacial acetic acid, turpentine, or biniodide of mercury. As a blister cantharides is a powerful vesicant. The tincture is occasionally given internally as an aphrodisiac.

Carbolic Acid.—Phenol is occasionally prescribed as an internal antiseptic and antifermentive in the liquid form. It is therefore useful in tympany of the rumen in cattle and sheep, and the colon in the horse.

Dose: Horse and ox, 20 to 60 minims; sheep, 5 to 12 minims. Externally it is used as an antiseptic, the strength usually being 1 : 30 to 1 : 60. As a caustic the pure acid is applied with care.

For antidotes, see Poisons.

Carron Oil.—Prepared by mixing equal parts of linseed oil and lime water. It is much used as a dressing for burns, and its value is increased by adding 1 to 2 per cent. carbolic acid.

Cascara Sagrada.—Is a laxative and tonic, and is especially useful in the dog and cat in cases of obstinate chronic constipation. Small doses repeated night and morning for a period are much better than large doses.

The *Liquid Extract* is the usual form prescribed.

Dose: Dog, 10 to 40 minims; cat, 2 to 4 minims.

Castor Oil.—Is occasionally given as a purgative in horses, cattle, dogs, and cats; but it is not so popular as it used to be, other agents appearing to take its place.

Dose: Horse and ox, 1 to 2 pints; sheep and pig, 2 to 4 ounces; dog, 2 to 8 drams; cat, 20 to 60 minims. It is also given as the initial dose in diarrhœa in foals, calves, and lambs.

Catechu.—Is a vegetable astringent, acting mainly in the large intestine. It is much used in diarrhœa and dysentery combined with chalk, cinnamon, and ginger.

Dose: Horse and ox, 2 to 4 drams; sheep and pig, 10 to 20 grains; dog, 5 to 10 grains.

Chenopodium, Oil of.—Has of recent years been much used as an anthelmintic.

Chinosol.—Was much used as an antiseptic some years ago, but now appears to be seldom prescribed. The strength is $\frac{3}{4}$ to 1 grain to the ounce of boiled water.

Chloral Hydrate.—A valuable internal antiseptic, antispasmodic, and anodyne. It is much used in acute gastro-intestinal derangements where there is much pain. It may usefully be combined with camphor.

It is also used sometimes as an anæsthetic, intravenously or intraproctoal.

Dose: Horse and ox, 1 to 2 ounces; sheep and pig, 30 to 90 grains; dog, 6 to 10 grains.

For antidotes, see Poisons.

Chloretone.—A local anæsthetic, antiseptic, and hypnotic. It is particularly useful in canine practice.

Dose: Horse and ox, 2 to 6 drams; dog, 5 to 10 grains; cat, 1 to 3 grains.

Chlorine.—Bleaching powder in the strength of 1 dram to 20 ounces of water makes a powerful antiseptic for wounds and ulcers.

Dakin's Solution (*Modified*).—Take 184 grains of bleaching powder and place in 5 litres of tap water, shake, and allow to stand for several hours; then take 92 grains of water-free carbonate of soda and 75 grains of bicarbonate of soda, and dissolve in 5 litres of water, shake, and mix the two solutions together. Shake vigorously and allow it to stand for half an hour, after which siphon off and filter the supernatant fluid, bottle and place in the dark. This solution will remain active for ten to twenty days. This makes a very useful antiseptic solution.

Eusol.—Take 135 c.c. of liquid chloride of lime—a 10 per cent. solution of bleaching powder in water—and dilute it to 750 c.c. with water, and add a saturated solution of boric acid to 250 c.c. Mix the two solutions together, shake well, allow to stand for two or three hours, and filter through cloth. This solution will keep two or three weeks if well corked. This makes the well-known hypochlorite solution.

Chloroform.—Used principally as a general anæsthetic, it is sometimes prescribed internally as a sedative, antispasmodic, and carminative.

Dose—as an anæsthetic, see Anæsthesia.

Dose *per oram :* Horse and ox, 1 to 2 ounces; sheep and pig, 2 to 4 drams; dog, 10 to 30 minims.

Cinchona.—Astringent, stomachic, vegetable tonic. It is conveniently prescribed with iron for diarrhœa and dysentery, and as a general tonic after debilitating diseases.

Dose: Horse and ox, 2 to 6 drams; sheep and pig, 20 to 40 grains; dog, 5 to 10 grains.

Tinctura Cinchonæ.—Dose: Horse and ox, 1 to 2 ounces; sheep and pig, 1 to 8 drams; dog, 20 to 30 minims.

Cinnamon.—Antiseptic astringent, antiperiodic. Combined with chalk and cinchona it is useful in diarrhœa. It is also stated to possess prophylactic properties in influenza.

Dose: Similar to cinchona.

Citric Acid.—Diuretic, lymphagogue. Given internally as it is, or as citrate of soda, it decalcifies the blood and facilitates the flow of lymph. Applied locally to wounds it facilitates osmosis, hence it is much used in conjunction with vaccine therapy.

Dose: Horse and ox, 2 to 4 ounces; sheep and pig, 2 to 4 drams; dog, 20 to 60 drams.

Cocaine.—Used as a local anæsthetic for surgical operations (see Anæsthesia).

Cod-Liver Oil.—Tonic and nutrient, it is useful in convalescence following continued fevers or debilitating diseases.

Dose: Horse and ox, 2 to 8 ounces; sheep and pig, 1 to 2 ounces; dog, 1 to 4 drams.

Colchicum.—Diuretic, antirheumatic. It is usually prescribed with alkalies.

Dose: Horse and ox, 1 to 2 drams; sheep and pig, 10 to 30 grains; dog, 3 to 6 grains.

Copper Sulphate.—Occasionally used as an intestinal astringent and general tonic. It is not such a favourite as sulphate of iron.

Dose: Horse and ox, 1 to 2 drams; sheep and pig, 10 to 20 grains; dog, 2 to 4 grains.

Creosote.—As an antiseptic it is of use in gastro-intestinal catarrhs; also as an inhalant in respiratory conditions. It is sometimes used in the treatment of wounds.

Dose: Horse and ox, 30 to 90 minims; sheep and pig, 10 to 15 minims; dog, 1 to 6 minims.

Croton Oil.—Much prescribed by older practitioners as a drastic purge, it is seldom used now.

Dose: Horse and ox, 10 to 30 minims; sheep and pig, 5 to 12 minims.

Damiana.—An aphrodisiac and generative tonic, is useful in sterility.

Dose in powder form: Horse and cow, 1 to $1\frac{1}{2}$ ounces. Liquid extract: Horse and cow, 3 to 6 drams; dog, 10 to 30 minims.

Digitalis.—Heart tonic, diuretic, expectorant. Being a cumulative drug, it should be combined with diuretics such as nitrate or chlorate of potash, acetate of ammonia, etc.

Dose: Horse and ox, 1 to 2 drams; sheep and pig, 5 to 12 grains; dog, $\frac{1}{4}$ to 2 grains.

The *Tincture* is usually prescribed in the dog, 2 to 10 minim doses.

Digitalin is used hypodermically.

Dose: Horse and ox, $\frac{1}{4}$ to $\frac{1}{2}$ grain; dog, $\frac{1}{100}$ to $\frac{1}{20}$ grain.

Ergot.—Ecbolic, styptic. This drug is occasionally used in uterine inertia, hæmorrhage, retained placenta.

Dose: Horse and ox, $\frac{1}{2}$ to 1 ounce; sheep and pig, $\frac{1}{2}$ to 1 dram; dog, 10 to 20 grains.

Extract of Ergot is used hypodermically.

Dose: Horse and ox, $\frac{1}{2}$ to 1 dram; sheep and pig, 10 to 20 minims; dog, 3 to 8 minims.

Eserine.—Principally used in equine practice for cases of intestinal stasis.

Dose: Horse (hypodermic), 1 to 2 grains, and repeated in a few hours if necessary.

Ether.—Inhaled it is an anæsthetic with or without chloroform (see Anæsthesia). Administered internally it is a diffusible stimulant, antispasmodic, and carminative. It is useful in colic and debility.

Dose: Horse and ox, 1 to 2 ounces; sheep and pig, 1 to 2 drams; dog, 10 to 30 minims.

Eucaine.—Local anæsthetic, similar to cocaine, but less toxic and requiring a larger dose.

Eucalyptus.—A volatile antiseptic, deodorizer, antipyretic. It is useful in specific fevers. As an inhalant it is prescribed in bronchitis, laryngitis, etc.

Dose: Horse and ox, 1 to 6 drams; sheep and pig, 10 to 30 minims; dog, 1 to 5 minims.

Fibrolysin.—Injected intramuscularly with the view to absorb fibrous growths. Its therapeutical results are variable.

Flavine—*Acriflavine and Proflavine.*—Very valuable antiseptic, non-toxic to the tissues, and does not retard phagocytosis. It is used in dilution 1:2,000 to 1:10,000. It may also be injected subcutaneously or intravenously 1 gramme to the litre of normal saline solution.

Formalin.—Antiseptic, disinfectant, deodorant. One dram dissolved in 20 ounces of water makes a useful antiseptic lotion.

Gentian.—A vegetable tonic and stomachic. Is a very useful bitter in veterinary practice.

Dose: Horse and ox, 2 to 8 drams; sheep and pig, 20 to 40 grains; dog, 5 to 10 grains.

The *Tincture* is usually prescribed for small animals, the dose for the dog being 30 to 60 minims.

Glycerophosphates.—Is a compound tonic composed of strychnine, caffeine, calcium, potassium, sodium, iron, magnesium.

The dose for dogs is 15 to 40 minims.

Guaiacol.—A powerful diaphoretic, analgesic, antipyretic. Is useful in acute rheumatism and other painful affections.

Dose: Horse, 1 dram; dog, 1 to 6 minims.

Guaiacum.—Similar to guaiacol.

Heroin.—A valuable agent in acute respiratory affections, and is usually prescribed with glycerine—glyco-heroin.

Dose: Horse, 1 to 1½ ounces; dog, 10 to 40 minims.

Hexamin—*Urotropin.*—A powerful urinogenital antiseptic. It is prescribed in bacterial affections of the urinogenital tract.

Dose: Horse and ox, 1 to 3 drams; dog, 5 to 10 grains.

Hydrochloric Acid Dil.—A powerful intestinal antiseptic and hepatic stimulant, usually combined with vegetable bitters such as gentian and quassia infusions. Given before meals to prevent excessive secretion, and after meals for deficient secretion.

Dose: Horse and ox, 2 to 6 drams; sheep and pig, 15 to 30 minims; dog, 5 to 15 minims.

Hydrocyanic Acid Dil.—Used as a gastric sedative combined with bismuth and an alkali.

Dose: Horse and ox, ½ to 1 dram; sheep and pig, 10 to 30 minims; dog, 1 to 4 minims.

For antidotes, see Poisons.

Hydrogen Peroxide.—A powerful antiseptic, it is used in all conditions of unhealthy wound surgery.

The official solution is 10-volume strength, 1 c.c. yielding 10 volumes of oxygen. This solution may be diluted three or four times with boiled water.

Hyoscyamus.—A powerful antispasmodic, useful in relieving spasms and inflammatory conditions of the bowels and urinary organs.

Dose—tinctura hyoscyami: Horse and ox, 3 to 6 drams; sheep and pig, 1 to 2 drams; dog, 10 to 30 minims.

Ichthyol.—A mild local anæsthetic and antiseptic.

Iodides—*Sodium, Ammonium, Potassium.*—Diuretic, febrifuge, absorbent, expectorant.

Dose: Horse and ox, 1 to 4 drams; sheep and pig, 10 to 30 grains; dog, 3 to 10 grains.

Iodine.—Antiseptic, absorbent, irritant, parasiticide. Used for a large variety of conditions, and is a most valuable drug.

Dose: Horse and ox, ½ to 1 dram; sheep and pig, 3 to 10 grains; dog, ½ to 1 grain.

The *Tincture* is used as a resolvent paint principally, and skin sterilizer.

Iodoform.—Principally used as a dry dusting powder for wounds. It is somewhat toxic for dogs, and should be used sparingly.

Ipecacuanha.—A valuable expectorant, it is much used in bronchial affections; as a cholagogue it is prescribed for liver derangements, and as an emetic in poisoning it is very reliable. It is also sometimes used in obstinate cases of diarrhœa and dysentery.

Dose: Horse and ox, 1 to 2 drams; sheep and pig, 10 to 20 grains; dog, ½ to 1 grain.

Ipecacuanha Wine.—Dose—Medicinal: 10 to 30 minims. Emetic: 3 to 6 drams.

Iron.—The salts of iron are hæmatinic, tonic, astringent. They are therefore useful in anæmia, debility, and diarrhœa.

Carbonate.—Dose: Horse and ox, 2 to 4 drams; sheep and pig, 20 to 40 grains; dog, 5 to 10 grains.

Dialyzed.—Dose: Horse and ox, 1 to 2 ounces; sheep and pig, 1 to 3 drams; dog, 10 to 20 minims.

Liquor Perchloride Dil.—Dose: Horse and ox, 2 to 8 drams; sheep and pig, 30 to 90 minims; dog, 5 to 10 minims.

Sulphate.—Dose: Horse and ox, 1 to 2 drams; sheep and pig, 10 to 30 grains; dog, 1 to 4 grains.

Ferri et Quininæ Citras.—Dose: Dog, 2 to 4 grains.

Ferri Phosphas Saccharatus.—Dose: Dog, 3 to 6 grains.

Ferri et Ammonii Citras.—Dose: Dog, 2 to 5 grains.

Syrupus Ferri Iodidi.—Dose: Dog, 10 to 30 minims.

Jalap.—A powerful cathartic seldom used. Sometimes prescribed for the pig in 1 to 2 dram doses.

Juniper.—The oil of juniper is occasionally used in horses and cattle as a stimulant, antispasmodic, and diuretic.

Dose: 1 to 2 drams.

Lead.—The salts of lead are used externally as astringent cooling lotions for sprains and injuries.

The well-known *White Lotion* is composed of 1 part acetate of lead and $\frac{3}{4}$ part sulphate of zinc, mixed with 20 ounces of water.

Lecithin.—A derivative from the yolk of egg. It is useful in nervous affections.

Dose: Dog, 2 to 4 grains.

Linseed Oil.—A valuable and safe laxative for horses and cattle.

Dose: 1 to 2 pints.

Lithia.—Alterative and antirheumatic, it is usefully prescribed in canine practice. The carbonate may be obtained in tablet form in 5-grain doses.

Lysol.—A useful antiseptic for general surgical purposes, and as it contains caustic potash it readily dissolves scales and cleanses the skin. As an antiseptic lotion the usual strength is 1 teaspoonful to a pint of water.

Magnesia.—Alterative, antacid, laxative, diuretic, cathartic.

Carbonate.—Dose: Dog, 5 to 15 grains.

Sulphate.—Epsom salts is almost exclusively prescribed in cattle practice. As a purgative—dose: 1 to 2 pounds advantageously combined with treacle and ginger.

Malt Extract.—Stomachic and tonic, it is usefully combined with cod-liver oil.

Dose: Horse and ox, 1 to 4 ounces; sheep and pig, 4 to 8 drams; dog, 1 to 2 drams.

Mercury.—The salts of mercury embody a valuable group.

Biniodide.—Given internally as an antiseptic absorbent, it is much used in actinomycosis in 5 to 10 grain doses for horses and cattle. Externally it is used as a blister (strength, 1:8).

Subchloride.—Calomel is a cathartic, intestinal antiseptic, and diuretic. It is useful in stoppage combined with aloes or sodium sulphate; in diarrhœa and liver complaints (small doses).

Dose—Cathartic: Horse and ox, 1 to 2 drams; sheep and pig, 10 to 30 grains; dog, 1 to 4 grains.

Perchloride.—A powerful antiseptic, it is much used in dressing wounds. Strength, 1:1,000.

Grey Powder.—Mercury and chalk is prescribed in canine practice as an alterative and purgative in 1 to 5 grain doses.

Donovan's Solution.—Composed of iodide of mercury and liquor arsenicalis. Is useful as an alterative, and is largely prescribed in skin diseases.

Dose: Horse and ox, 1 to 2 ounces; dog, 5 to 15 minims.

Morphia.—*Morphinæ Hydrochloridi* (B.P.), used hypodermically, is a powerful sedative and anodyne, and is largely given in acute painful abdominal and chest affections and acute nervous diseases.

Dose: Horse and ox, 2 to 4 grains; sheep and pig, ½ to 1 grain; dog, $\frac{1}{16}$ to ¼ grain.

Tinctura Chloroformi et Morphinæ Composita.—The active agents are morphia, hydrocyanic acid, chloroform, Indian hemp, capsicum, glycerine, peppermint, and alcohol. The tincture is a valuable anti-spasmodic.

Dose: Horses and cattle, 2 to 4 drams; sheep and pig, 20 to 60 minims; dog, 5 to 10 minims.

Mustard.—A valuable rubefacient and counter-irritant, it is used in chest, abdominal, and rheumatic affections. Mixed with vinegar to enhance its irritant effects, a little turpentine should be added, particularly in cattle diseases.*

Nitric Acid.—A powerful caustic, it is used to burn down warts and other skin excretions.

Nitrohydrochloric Acid.—Largely used as a liver stimulant combined with bitter infusions.

See also Hydrochloric Acid for dose, etc.

Novocaine.—A local anæsthetic, the strength used being in solution 3 to 5 per cent., it is usefully combined with adrenalin. It is less toxic than cocaine.

Nux Vomica.—A valuable vegetable tonic and nerve stimulant. It is often combined with other vegetables, as gentian, cinchona. Useful in indigestion, constipation, paralysis, etc.

Dose: Horse and ox, 1 to 2 drams; sheep and pig, 10 to 15 grains; dog, ½ to 2 grains.

Tincture.—Dose: Horse and ox, ½ to 1 ounce; sheep and pig, 10 to 30 minims; dog, 1 to 7 minims.

For antidotes, see Poisons.

Olive Oil.—Laxative, nutrient, and lubricant, it is said to act beneficially on gall-stones.

Dose: Dog, 2 to 4 drams.

Opium.—Sedative, narcotic, anodyne.

Dose—powdered form: Horse and ox, 1 to 3 drams; sheep and pig, 10 to 30 grains; dog, ½ to 2 grains.

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* A proprietary preparation known as Musterole is useful in canine practice, being clean to use.

Tinctura Opii.—Dose: horse and ox, 1 to 3 ounces; sheep and pig, 1 to 4 drams; dog, 10 to 15 minims.

Papain.—A digestive agent similar to pepsin.

Dose: Dog, 1 to 5 grains.

Paraffin.—Medicinal paraffin has largely taken the place of castor oil for the smaller animals. It is not acted upon by the alimentary secretions. Acting, therefore, purely as a mechanical lubricant, it is given in intestinal stasis and obstructions.

Dose: Dog, 4 to 8 drams.

Paraldehyde.—Hypnotic, antispasmodic, diuretic, and expectorant.

Dose: Dog, 15 to 60 minims.

Peppermint—*Oleum Menthi Piperitæ.*—Carminative, antispasmodic, stimulant, it is usefully given as a flavouring agent for other active agents.

Dose: Dog, ½ to 2 minims.

Pepsin.—As a digestive agent it is useful in small animals.

Dose: Dog, 3 to 6 grains, combined usefully with hydrochloric acid dil.

Peptonized Milk.—Take 14 ounces of cold milk and mix with 6 ounces of water; divide into equal parts, one of which is boiled and then mixed with the cold portion. Now add ½ ounce of liquid pancreatis and 30 grains of bicarbonate of soda. Mix and allow to stand for fifteen minutes, after which boil to arrest peptonization, cool to milk heat, and use.

Permanganate of Potash.—Disinfectant, antiseptic, deodorant. It is occasionally prescribed internally for intestinal fermentation, also diarrhœa and dysentery. Well diluted it makes a dressing for wounds.

Dose: Horse and ox, ½ to 1 dram; sheep and pig, 10 to 20 minims; dog, 1 to 2 grains.

Phosphatis—*Easton's Syrup.*—An excellent general tonic for dogs used carefully, as it contains strychnine, in doses varying from 10 to 30 minims two or three times a day after meals.

Parrish's Syrup.—Similar to Easton's Syrup, but as it does not contain strychnine, may be used more freely in doses of 20 to 40 minims.

Phosphorus.—Used as a nerve tonic, but it is best prescribed with other compound agents.

Pilocarpine.—A powerful stimulant upon the secretory glands, especially the salivary, it is used in conjunction with physostigmine in intestinal obstruction.

Dose: Horse, 1 to 3 grains; dog, $\frac{1}{30}$ to ¼ grain.

Potassium—*Bicarbonate.*—Antacid, diuretic, expectorant, it is useful in catarrh of the gastro-intestinal and bronchial mucosæ.

Dose: Horse and ox, 1 to 3 ounces; sheep and pig, 30 to 90 grains; dog, 5 to 10 grains.

Chlorate Febrifuge.—Diuretic, antiseptic, expectorant, it is useful in all fevers and catarrhs of the respiratory mucosæ.

Dose: Horse and ox, 2 to 4 drams; sheep and pig, 20 to 30 grains; dog, 5 to 10 grains.

Poultices.—These are made from a variety of substances: bran is probably the cleanest and most handy; oatmeal, linseed. A poultice should be so adjusted that it is retained in close apposition to the affected parts, and sufficiently large to retain the heat for a considerable period. Antiseptics, in the case of wounds, should be added, while common salt in addition facilitates osmosis.

Quassia.—A vegetable tonic similar to gentian. It is often combined with hydrochloric acid.

Dose—infusion: Horse and ox, 3 to 6 ounces; sheep and pig, 2 to 6 drams; dog, 20 to 40 minims.

Quinine.—A bitter tonic, antipyretic, antizymotic, antiperiodic, it is prescribed in all fevers, particularly low fevers. It is also useful during convalescence.

Dose: Horse and ox, 1 to 2 drams; sheep and pig, 10 to 20 grains; dog, 1 to 2 grains.

Resorcin.—A powerful antiseptic, it is given in bacterial invasions of the intestines. Externally it makes a non-irritating antiseptic lotion (strength, 2 per cent.).

Dose: Horse and ox, 1 to 3 drams; sheep and pig, 15 to 20 grains; dog, 1 to 4 grains; foals and calves (in diarrhœa), 20 to 60 grains.

Rhubarb.—In small animals it is prescribed as a tonic, stomachic, purgative. It is also useful in bowel affections in calves and foals.

Dose: Calves and foals, 1 to 3 drams; dog, 10 to 20 grains.

Salicylates.—Analgesic, antiseptic, febrifuge, diuretic, diaphoretic, antirheumatic, they are useful in all fevers and painful conditions.

Aspirin.—Lowers temperature, relieves pain.

Dose: Dog, 5 to 10 grains.

Oil of Wintergreen.—Usefully combined with menthol and made into an ointment (strength, 20 to 30 per cent.), it relieves pain in strained tendons or rheumatic joints.

Salol.—Intestinal antiseptic, it is prescribed for diarrhœa and dysentery, also in gastro-intestinal catarrh in distemper.

Dose: Dog, 5 to 10 grains.

Salicylate of Soda.—A much used drug possessing all the virtues of the salicylates.

Dose: Horse and ox, 1 to 4 drams; sheep and pig, 20 to 60 grains; dog, 5 to 10 grains.

Salicylic Acid.—Similar to salicylate of soda.

Santonin.—A powerful anthelmintic, used in expelling round and threadworms. It should be given on an empty stomach combined with calomel.

Dose: Dog, 2 to 4 grains.

Senna.—*Fluid Extract* is a useful agent in canine practice, being a safe laxative.

Dose: 10 to 20 minims.

Silver—*Nitrate* (*Lunar Caustic*).—Astringent and caustic, it is used in burning down excessive granulations, unhealthy ulcers, and malignant growths. For ulcers in the eye, it is used as a lotion (strength, 1 to 2 grains to the ounce of distilled or rain water).

Argyrol.—An organic compound of silver. It is useful in the treatment of eye affections (strength, 25 per cent. in distilled or rain water).

Protargol.—Similar to argyrol.

Sodium—*Bicarbonate.*—Antacid, alterative, diuretic, it is freely prescribed in intestinal and urinary disorders.

Dose: Horse and ox, 1 to 3 ounces; sheep and pig, 2 to 6 drams; dog, 5 to 20 grains.

Carbonate.—Similar to bicarbonate, but somewhat irritating. It is often given by laymen in cases of equine colic.

Dose—subcutaneous: Horse and ox, 4 to 8 pints; dog, 10 to 30 ounces.

Chloride.—A valuable alterative, stomachic, diuretic, vermifuge. It may be given freely in food or as a purgative for ruminants combined with salts and treacle. It is a handy emetic for the dog and cat in poisoning. It is also a valuable but overlooked drug in canine distemper.

Dose: Horse and ox, 2 to 4 ounces; sheep,* ½ to 1 ounce; dog, 10 to 20 grains.

Normal Saline Solution.—Strength, 1 dram to 20 ounces.

Hyposulphite.—Alterative, diuretic antirheumatic, antiseptic.

Dose: Horse and ox, 1 to 2 ounces; sheep and pig, 30 to 90 grains; dog, 5 to 10 grains.

Sulphate (*Glauber's Salts*).—A saline alterative and purgative much used in cattle practice.

Dose—Alterative: Similar to hyposulphite. Purgative: Ox, 1 to 2 pounds; sheep and pig, 2 to 3 ounces.

Stramonium.—Used as an antispasmodic in asthma and broken wind.

Dose—tincture: Horse, 1 to 2 ounces; dog, 3 to 6 minims.

Strophanthus.—A cardiac tonic and diuretic, it is occasionally prescribed instead of digitalis and for similar purposes.

Dose—tincture: Horse and ox, 1 to 2 drams; dog, 2 to 5 minims.

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* The pig should not have common salt.

Strychnine.—A powerful neuro-muscular stimulant and tonic, it is prescribed in a large variety of conditions, but care must be exercised in its proper use. It is usually given hypodermically in the following doses:

Dose—liquor strychninæ hydrochloridi: Horse and ox, ½ to 1 dram; sheep and pig, 10 to 20 minims; dog, 1 to 2 minims.

Sulphocarbolates—*Sodii and Zinci.*—Principally used externally as sprays, douches, and for wound injection, the strength being 1 to 2 per cent.

Sulphur.—Alterative, diuretic, internal antiseptic, vermifuge, and antiparasiticide.

Flowers of Sulphur.—Dose: Horse and ox, 1 to 2 ounces; sheep and pig, 1 to 4 drams; dog, 10 to 15 grains.

Liquor Calcii Sulphurate.—Made as follows: Slaked lime, 4 parts; sulphur, 4 parts; water, 35 parts; boil and filter. Useful in scabies and skin diseases generally.

Sulphuric Acid.—Usually prescribed in the aromatic form. It diminishes intestinal secretion, and is therefore useful in diarrhœa. Combined with belladonna it is a useful agent in chronic cough in horses.

Dose: Horse and ox, 2 to 3 drams; sheep and pig, 15 to 20 minims; dog, 3 to 7 minims.

Tannin.—Astringent and styptic, it is prescribed in diarrhœa and dysentery, and also in hæmorrhage. In addition it is an antidote to many poisons. (See Poisons.)

Dose: Horse and ox, 1 to 2 drams; sheep and pig, 10 to 20 grains; dog, 3 grains.

Tar.—Is a local and internal antiseptic.

Liquor Carbonis Detergens.—An excellent wound dressing and skin parasiticide (strength, 1 dram to 20 ounces of water).

Stockholm Tar.—Used for dressing wounds in the region of the feet, and effectually keeping out dirt and moisture. It is also sometimes given in bronchitis and coughs.

Thymol.—An antiseptic and anthelmintic, inhalant, and parasiticide.

Dose: Horse, 1 to 2 drams; dog, ½ to 1 grain. As an anthelmintic double or treble these doses may be given, preferably in milk. Externally the strength is 1 to 2 per cent. in water.

Turpentine.—A diffusible stimulant, diuretic febrifuge, antiseptic, antifermentive, vermifuge, counter-irritant, styptic, it is used in a very large variety of conditions.

Dose: Horse and ox, 1 to 4 ounces; sheep and pig, 2 to 6 drams; dog, 5 to 20 minims.

Terebine is a refined form and less irritating than turpentine.

Valerian.—An antispasmodic and nerve stimulant.

Dose: tincture—Horse and ox, 1 to 2 ounces; sheep and pig, 1 to 2 drams; dog, 20 to 40 minims.

Veratrine.—A powerful neuro-muscular stimulant and tonic, it is prescribed in gastro-intestinal conditions, particularly impactions, also in emphysema of the lungs.

Dose: hypodermic—Horse and ox, 1 to 3 grains.

Zinc—*Chloride.*—A powerful caustic, astringent, and antiseptic (strength, usually ½ to 1½ per cent. in water).

Oxide.—Externally it is used as an astringent and desiccant, usually in the form of an ointment, 1 : 6 or 1 : 8.

Sulphate.—Internally, astringent nerve tonic, emetic; externally, antiseptic.

Dose—Tonic and astringent: Horse and ox, 1 to 2 drams; sheep and pig, 8 to 16 grains; dog, 1 to 2 grains. Emetic: Dog, 10 to 20 grains dissolved in water.

Lotion strength, 4 per cent. in water. Coloured with compound tincture of lavender it makes red lotion.

MEGRIMS.

This condition must be looked upon not as a disease in itself, but as a symptom of some functional or organic derangement. Thus, it may have its origin in the circulation; in the heart in old-standing diseases of the valves, or the muscular wall in dilatation; defective pulmonary circulation or emboli in the general circulation; the digestive system—*i.e.*, overloaded stomach, gastric hyperæmia, hepatic congestion, intestinal worms; the nervous system, as seen in optic nerve and aural irritation, cerebral anæmia or hyperæmia; nasal, due to the presence of parasites in the horse's, sheep's, dog's nasal cavity. It will be obvious, therefore, that before the condition can be rectified the source of the trouble must be diagnosed, but this, it may at once be confessed, is not always easy, and in some cases treatment is largely palliative and often empirical. A general line of treatment can only, therefore, be laid down here, each case being more or less a law unto itself.

Where the patient is an overfed and underworked horse, a pampered dog, or an ox gorged with rich food to hasten fattening, a restriction of diet and a full purgative dose of medicine is always safe advice. The purgative lowers blood-pressure, eliminates toxins from the circulation and effete material from the alimentary canal, while it stimulates the lacteals and the kidneys. In fat, full-blooded animals, phlebotomy may be carried out with advantage. Badly fitting collars, pressing on the jugular veins, should be rectified, and also the headstall of the bridle if it irritates the base of the ear. Some animals are very susceptible to the effects upon their eyes of the strong sun rays reflected from the snow or even from the white dust of the roads, in which case the journey may be completed in safety by covering the eyes with cloth or leather; in the case of the former, green baize is best. If wax or larvæ are in the ears, these must be removed by syringeing. Where parasites are located in the nasal cavities, irrigation with normal saline solution and eucalyptus is usually efficacious.

When the heart is at fault, toning up with digitalis and nux vomica is indicated. If the origin is gastric, a course of alkalies, followed later by acids—nitrohydrochloric—is advised. If intestinal worms are present, helminthics should be prescribed.

In the case of the horse suddenly seized while at work, all harness should be removed, and if the sun is strong he should be placed in the shade, cold water thrown over the head, and bled if considered advisable, either from the eye vein, the palate, or the jugular. In all animals inclined to constipation or sluggishness of the liver, laxative diet and alterative laxative doses of medicine such as sodium sulphate are strongly recommended.

MEIBOMIAN GLAND, DISEASE OF.

Some animals are occasionally subject to this condition, which, owing to its bacterial nature, is liable to lead to conjunctivitis or even ophthalmia. It therefore should not be neglected. Bathe the lids with warm boric lotion, dry, and smear two or three times a day with Singleton's Golden Ointment (yellow oxide of mercury).

MEMBRANA NICTITANS.

Inflammation may extend from the conjunctiva, or it may originate primarily in the organ itself, usually the result of an injury. Hot fomentation and the application of weak boric lotion usually effects recovery in a few days.

It is not uncommon to find malignant growths developing on the membrane;* these are particularly noticeable in cattle and dogs, especially epithelioma, which, if neglected, may lead to fatal results. The writer has seen several cases in cattle where extension has taken place to the eye, causing destruction to the bones forming the orbital socket and extending to the meninges, ending in death. The stench from these extreme cases, especially in the summer months, beggars description. Obviously treatment should be undertaken before this stage is reached. When the growth is confined to the membrane, treatment is purely surgical. The animal should be cast, chloroformed, or a concentrated local anæsthetic used, an eye speculum inserted, and the membrane seized with a pair of forceps, drawn outwards as far as possible, and, with a pair of curved blunt-pointed scissors, the membrane severed close up to its root. Bleeding is profuse at first, but soon stops. After-treatment consists of bathing the part with weak boric lotion night and morning. If the whole neoplasm has been removed, recurrence is very unusual, but one sometimes finds even in the early stages extension to the lids has taken place, in which case these should have surgical attention at the same time.

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* The writer has also observed four cases of *primary* active mycosis of the membrane in which surgical removal effected a cure.

MENINGITIS. *See* **Brain, Diseases of.**

METRITIS.

This condition is seen in all the domestic animals following parturition, but probably the cow is the greatest martyr, perhaps by reason of the fact that of all animals she is the most tolerant to parturient sequelæ, including prolonged retention of the after-birth; hence a degree of indifference exists in the mind of the owner, prophylactic and curative measures being seldom called into requisition until advanced and pronounced symptoms are made manifest. When the practitioner is called in, the patient is usually feeding badly, has a rapid pulse and a high temperature. There may or may not be symptoms of septic *infection* or *intoxication*.

The first step in mares and cows, after washing the vulva with an antiseptic, is to smear the hand with carbolized oil or other suitable agent, pass it into the vagina, and examine the os uteri to see whether that organ is open or closed. If the former, the hand, cone-shaped, is rotated to dilate the os and so allow passage into the uterus with the object of ascertaining whether pieces of placenta are present, in which case their removal is essential. If there is much fluid in the uterus, it should be mopped out by carrying in pieces of gauze or boiled bits of linen sheeting, for it must be remembered that such an accumulation acts as a foreign body, retarding, among other things, uterine contraction. Many practitioners advocate injecting warm antiseptics into the uterus and siphoning the fluid off. This procedure, to the writer's mind, has always appeared irrational and unscientific. Injecting fluid into the uterus, already inflamed, flabby, and inert, is an easy matter; withdrawing that fluid *completely* with the natural expulsatory efforts exhausted is another matter. Again, the supposed function of the antiseptic douche is to destroy bacteria. That it *dilutes* the latent fluid in the womb no one will deny, but that fluid is largely spent and composed of dead or dying bacteria, leucocytes which have fallen in the fight, cells from the mucosæ, etc., while the active pathogenic organisms are to be found housing themselves in the interstices of the mucosæ, safely protected from the action of the antiseptic douche.

If the os uteri is closed, or nearly so, in the writer's opinion no attempt should be made to open it; far better is it to remain closed, and here very warm *vaginal* antiseptic douches (110° F.), injected night and morning medicated with salt and proflavine or Lysol or boric acid, are capable of doing much good. Antiseptic pessaries, when they can be inserted into the body of the womb, are most valuable agents repeated daily. For the first three or four days the writer advises a pessary of proflavine, boric acid, and sodium citrate, after which it should be changed to one composed of proflavine and cretæ præparatæ.

Constitutional treatment consists of giving the patient an aperient at the outset. If the temperature is high, salicylic acid and quinine are two valuable agents repeated in moderate doses three or four times a day. If the pulse is weak and running down, digitalis, ammonia, and potassium nitrate are indicated, while the hypodermic injection of strychnine, caffeine, or camphor, may tide the patient over a critical phase. If there is evidence of toxæmia, the daily injection subcutis of normal saline solution is most beneficial. The hypodermic injection of ounce doses of turpentine is also advised, but not more than two should be given.

When the uterus is flabby and has lost its contractile power, the writer can strongly recommend an occasional hypodermic injection of pituitrin. When the kidneys are sluggish, turpentine, acetate of ammonia, or potassium chlorate are indicated.

If the patient is not feeding, the strength must be maintained by giving gruels, eggs, milk, etc., and later on, when the acute stage has been reduced, a course of vegetable and mineral tonics is always useful.

In the case of the smaller animals, such as the dog and cat, palliative measures modified on the above lines are advised. Should these fail—and they often do, the disease tending to take on a chronic phase—ovario-hysterectomy, provided the patient is not too exhausted, offers the only and most hopeful chance for recovery.

Vaccine Therapy.—In all cases of metritis pathogenic organisms are the root cause of the disease. They may confine their activities to the superficial layers of the mucosæ; invade the matrix, especially in cases of abrasion; and even extend to the peritoneal coat, constituting metroperitonitis. It is obvious, therefore, that the sooner the case is taken in hand the better are the chances of recovery. The most common infections seen in practice are streptococcal and *B. coli;* but before successful treatment can be adopted, a microscopical examination of the *materiès* must be made, and from it an autogenous vaccine prepared. It must be pointed out, however, that if the case is running a very acute course with septic infection or intoxication much in evidence, an *antiserum* at the beginning of the treatment is advised rather than a *vaccine*, for the obvious reason that the former supplies the necessary antibodies already prepared, immediate action being obtained, while the latter stimulates the natural body resources, but in so doing draws upon them, at first with consequent general depression, to an extent which in some cases Nature can ill afford.

In any case, if vaccination is decided upon, the initial dose or doses *must be small*, to obviate the risk of too great a negative reaction.

The writer for some years, in severe cases, has advocated, with the view of reducing the negative phase to a minimum, the combination of vaccines and sera until the more acute phase has passed, and, later on, using vaccines alone.

In the smaller animals, in addition, the injection of antisera direct into the womb through the os in the early stages of the disease has given the writer fair results, and should be more generally practised.

Prophylaxis.—Animals suffering from metritis should be isolated, and their box, stall, or kennel, frequently disinfected. All instruments should be sterilized before delivery is attempted, and kept sterile as far as practicable throughout the operation. After parturition antiseptic pessaries should be used. Retained placentas should be removed early. Debilitated animals after parturition should have an abundance of good rich food. The surroundings should be as healthy as possible, and disinfectants freely used.

MILK, ABNORMALITIES OF.

Bitter Milk may be produced by bitter herbs in the grass or feeding on an excess of turnips. Micro-organisms are also capable of transmitting a bitter flavour. A change of diet is indicated, along with a saline purgative, followed by a course of sodium bicarbonate and potassium nitrate.

Blue Milk is caused by the presence of *B. cyanogenus*. Treatment consists of giving a purgative, sodium sulphate, and treacle, followed by doses of turpentine.

Clotted Milk is indicative of fermentation, to correct which a saline purgative is advised, followed by alterative doses of sodium bicarbonate and sodium chlorate.

Red Milk may be due to hæmorrhage from the udder itself, but more often it is caused by the presence of chromogenic organisms. Treatment consists of a saline purgative, followed by doses of sulphate of iron alternated with turpentine.

In all cases of abnormal milk, the diet should be looked into, and the udder carefully examined. When animals are running at grass, it is always a wise policy to give them a change to fresh pastures.

MILK FEVER.

In the days before Schmidt's discovery, one could have written a small brochure on the treatment of milk fever, largely due to the fact that we were all groping in the dark and no satisfactory system had been evolved. Schmidt has altered all this, for he has given us a simple, safe, and reliable treatment, so that milk fever—so called—is no longer the *bête noir* of the dairyman or the bugbear of the practitioner.

Where the case is seen moderately early there is no reason why complete recovery should not follow. In those cases, however, where the patient has been neglected and left for hours unattended, particularly where the exciting stage preceding coma has been prolonged and severe cerebral hæmorrhage—true apoplexy—has set in, treatment is always of no avail. In those cases, although partial restoration to consciousness may follow, the patient will never be a healthy proposition, and on economical grounds it should be destroyed.

In the early stages of milk fever the animal may be found resting on its breast, its head thrown back on its side. As the disease advances, it rolls on to its side, and should it remain there any length of time, tympanites follows, with the consequent liability that gas and ingesta pass up the gullet and may find their way into the trachea, setting up traumatic pneumonia and death. These risks should be warded against by advising one's clients always to prop up milk fever patients with sandbags or bundles of straw.

On arriving at the case, the practitioner should give instructions to have the udder stripped clean, a procedure which generally aggravates the milk fever symptoms. The nipple of the teat is then painted with tincture of iodine or Lysol solution, and a pint of boiled water to which is added proflavine or permanganate of potash (1: 2,000) injected into each quarter, after which air is pumped into the organ until it becomes quite tense; the teat may then be ligatured to prevent the escape of the injected air. When all the quarters are treated thus, the udder is well massaged with the hand. Clean bedding or sacking is placed on the ground for the udder to rest on, and the animal propped up on its breast. The teat ligatures should be removed in two or three hours, and in from five to ten hours, if all goes well, the patient should be on her legs. Occasionally a second or even a third injection is required, but this is indeed very rare. The udder is left untouched for twelve to twenty-four hours, when each quarter should be slightly stroked out, repeating every three or four hours until the normal flow is reached. The calf must be muzzled or tied up for the first twenty-four or thirty-six hours after injection. When mastitis follows the injection, the operator's technique is generally at fault. Too much care cannot be exercised in using a sterile solution, sterile receptacle, and sterile syringe and needle.

The instrument the writer uses is an improvised human enema syringe attached to which is an improvised milk siphon.

Some practitioners use potassium iodide, peroxide of hydrogen, etc., in solution; others, filtered air; and others, oxygen. It is really immaterial, however, what agent is used so long as a sufficiency of pressure is exerted and maintained upon the milk-producing cells.

Occasionally one comes across a case where restoration to the normal is reached in so far as the animal eats, drinks, chews its cud, but is unable to stand. Such cases require additional treatment, consisting of applying a mustard plaster to the loins and administering doses of nux vomica and ammonium carbonate, with frequent rolling from one side to the other, and, if the bowels are constipated, doses of sodium sulphate and treacle with a laxative diet. Cows in the early or advanced stages of milk fever should never be drenched, nor is it necessary to give hypodermic injections of strychnine, veratrine, caffeine, camphor, as advocated by some authorities, where the case runs a normal course.

Prophylaxis.—Undoubtedly milk fever in some instances can be prevented by semi-starving the animal a week before calving, by limiting the drinking supply, by lowering the blood-pressure with laxative saline aperients combined with calomel before and after calving, by not milking the animal for twenty-four to thirty-six hours after calving, and by not breeding from a patient which has had milk fever.

Finally, as there exists an undoubted hereditary predisposition in many cases, this fact should be pointed out to owners.

MUD FEVER.

Dermatitis of the skin due to the direct irritating effect of mud is nowadays a rare condition by reason of the fact that, roads being tarred, mud accumulation is indeed very uncommon.

The patient should have a full dose of physic, and the affected parts on the legs and abdomen be well washed with hot water, soap and soda, dried, and an astringent antiseptic lotion—such as zinc sulphate, 1 ounce; liquor carbonis detergens, 1 ounce; water, 1 quart—lightly applied night and morning. If the heels are badly affected, zinc or boric ointment should be applied. The limbs should be kept as dry as possible; and if the drainage in the stable is defective, this must be corrected. In the winter-time, particularly if there is half-melted snow on the ground, the patient should be kept indoors. In obstinate cases it is sometimes advisable to place the animal on a course of arsenic, iron, and potassium nitrate.

MYCOSIS.

This condition may be encountered in all the domestic animals: in herbivora, as the result of eating decomposing or tainted vegetable matter; in carnivora, decomposing or toxin-poisoned animal foods.

The constant symptom is gastro-intestinal catarrh, followed by gastro-enteritis with great depression, and later by auto-intoxication and even infection.

In animals that vomit, an emetic should be given at once. In the horse and ox, an oleaginous aperient combined with a moderate dose of calomel is advised. In the dog, pig, and cat, medicinal paraffin and calomel is useful. Subsequent treatment in all animals should consist in giving small oft-repeated doses of boric acid, sodium hyposulphate, bismuth, and sodium bicarbonate. When the heart's action is weak, hypodermic injections of digitalin, caffeine, and camphor are recommended. In all cases the subcutaneous injection of normal saline solution tones up the circulation, washes the blood free of toxins, and stimulates the eliminative organs. If there is pronounced abdominal pain, sedatives are indicated—chlorodyne, camphor, chloral hydrate. If convalescence sets in, the patient should be placed on tonics and ordered a light digestible diet. The normal functions of the digestive system, especially in the dog, may be so deranged that careful subsequent treatment is called for. This should be carried out on the lines laid down for dyspepsia.

MYELITIS.

Inflammation of the spinal cord in animals is not very common. As seen in practice, it is usually traumatic. Occasionally it is a sequel to such diseases as influenza, particularly the effusive form; strangles, especially the irregular form; septicæmia; pyæmia. In the case of the horse, it is usually advisable to place the patient in slings. In all animals a bold purgative should be given at the outset, and a stimulant rubbed into the skin along the course of the spine. A fresh sheep-skin, in the horse, applied to the loins is excellent. If the animal is restless and in much pain, bromide of potassium combined with salicylic acid is advised; and if the animal is in high condition, bleeding may be recommended. As there is usually difficulty in defæcating and urinating, the fæces and urine should be removed at intervals by enemas and the catheter. In the dog hot hip-baths and careful drying afterwards give considerable relief. When the acute stage has become reduced, with symptoms of paralysis, electricity in the shape of intermittent induction current should be tried, especially in dogs. The hypodermic injection of strychnine is also useful. For the horse and ox, 1 grain night and morning; and for the dog, $\frac{1}{60}$ to $\frac{1}{25}$ grain. In those cases due to fracture of the vertebræ, treatment is as a rule useless, and the animal should be destroyed. Where there are indications of spinal effusion, lumbar puncture may be tried (which see) and the patient placed on a course of potassium iodide. In obstinate cases the flat hot iron may be used daily along the spine. The method the writer adopts is to lay over the loins a piece of flannel soaked in water and wrung out almost dry. This is ironed with the flat laundry iron, made hot enough for the animal to bear it. When the flannel becomes dry, it is re-moistened. The operation should be continued for twenty to thirty minutes, and repeated daily.

Wasting of the muscles of the loins is a common after-result, to rectify which blistering and gentle exercise is called for.

NASAL CATARRH. *See* **Catarrh (Nose).**

NASAL NEOPLASMS.

These are malignant and benign, and in each case surgical interference is necessary. In the case of the horse and ox, these animals are cast and chloroformed; and when unilateral, the affected nostril should be uppermost. If the base of the growth is sessile, as much as possible should be removed with the knife and the remainder carefully curetted, care being taken not to injure the underlying bone too much, where it is found to be healthy, but, if diseased, removal of the osseous elements is also necessary.

Should the tumour be situated far up the nostril and out of reach by the inferior nares route, trephining (see Trephining) is necessary. If the growth is pedunculated, removal by the ecraseur or by the polypus snare is an easy matter. In the dog and cat, however, owing to the narrowness of the nasal passage, this may be somewhat difficult, and even impossible, in which case trephining is indicated. Where the polypi are multiple, there is often a tendency to recurrence, even after careful scraping. In these cases the writer has found repeated painting with a strong solution of sulphate of copper beneficial, and if this fails the electric cautery should be tried. In the dog and cat, painting the seat of operation with a local anæsthetic, such as eucaine combined with adrenalin, is much safer than general anæsthesia.

After operation the nasal cavity should be irrigated once or twice daily with an astringent such as sulphate of copper or sulphate of zinc.

When one is dealing with osseous tumours, the bone chisel, and even the bone saw, may be required to effect removal.

NAVICULAR DISEASE.

Curative treatment can only be of any avail here when applied in the early stages of the disease. The shoe having been removed, the foot is placed in a hot-water bath with a temperature of 110° F. for an hour, at the same time Bier's treatment (which see) being applied. This is repeated once or twice daily for a week. In the meantime the patient should have a full dose of physic and be placed on a low laxative diet.

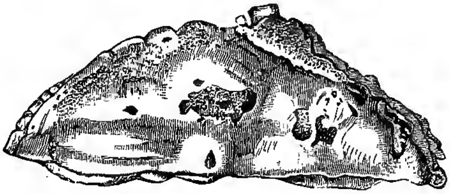

FIG. 94.—NAVICULAR BONE, SHOWING NECROSED CENTRES AS SEEN IN ADVANCED NAVICULAR DISEASE.

(Dollar's "Regional Surgery.")

Subsequently the coronet should be severely blistered and the patient turned out for two or three months on soft boggy land. Should no improvement follow this treatment, setoning may be tried. This consists of passing a curved needle armed with tape from the hollow of the heel through the plantar cushion, extruding near the point of the frog, the horn of which at that point having been previously pared down. If the twitch is tightly applied, the animal usually stands the operation very well. In highly nervous patients, however, it may be necessary to inject an anæsthetic on the metacarpal nerves. The seton should be moved up and down once or twice daily and dressed with equal parts of turpentine, creosote, and rape oil. In ten to twelve days the seton is removed, a blister applied round the coronet, and the animal turned out on soft boggy ground for two or three months. If the lameness has disappeared, shortening the toe and shoeing with pneumatic pads tends to prevent a recurrence.

If the above treatment fails, or where the case is an advanced one, neurectomy (which see) offers the only chance for future usefulness.

Prophylaxis consists in not breeding from affected animals, or even from those with contracted heels and narrow feet; regular exercise, particularly in high-spirited animals; careful shoeing, and keeping the toe well pared down to reduce leverage.

NECROBACILLOSIS.

The bacillus of necrosis invades the tissues of all the domestic animals, while in some cases the internal organs are attacked. In the latter case, however, treatment is of no avail and need not be discussed here. In Nature the organism has a very wide distribution; it cannot, therefore, be wondered at that abrasions of the skin and mucosæ often become infected by the bacillus. As the organism is an anaerobe, deep-seated wounds should be laid open, carefully curetted, and all necrotic tissue removed. They should then be irrigated with normal saline solution, to which is added citric acid, and the cavity packed with gauze soaked in peroxide of hydrogen. Where a mucosa is the seat of infection, and it can be reached, painting with tincture of iodine is advised. When ligamentous and tendinous structures are attacked—as in poll evil and fistula of the withers—or cartilaginous elements—as, for example, in quittor—radical surgery and complete excision of the necrotic mass give the only hope for recovery.

Prophylaxis.—Wounds and bruised tissues should be treated antiseptically from the time of injury, and in the case of systemic invasion, the healthy should be separated from the affected and the surroundings made sanitary.

NEPHRITIS. *See* Kidney Diseases.

NETTLERASH.

This is seen most commonly in the horse, the ox, and the dog; it is due to external irritation of the skin or the ingestion of certain foods which cause a primary irritation of the alimentary mucosæ, and through the nervous and circulatory system makes itself manifest by irritable patches on the skin.

Treatment consists in giving a brisk purgative: aloes for the horse, sodium sulphate for the ox, and calomel or podophyllin for the dog. This is followed by alterative salines: magnesium sulphate, sodium bicarbonate, potassium nitrate. The diet should be entirely changed to that which is recognized as being light and digestible. In some cases it may be advisable to bathe the skin swellings with a cooling lotion, such as lotio alb. Where there are symptoms of dyspnœa, it may be considered advisable to perform tracheotomy, but this is rarely required in practice.

NEURALGIA.

Where this condition is diagnosed, treatment may be divided into local and general. Under the former, the application of heat, in the shape of hot fomentations or, in the case of small animals, hot-water bottles; of sedative liniments, such as belladonna, tincture of opium, tincture of aconite, chloroform, turpentine, menthol, iodine, oil of wintergreen; of counter-irritants, such as blisters, the actual cautery, setons; of electricity, faradism or galvanism; of hypodermic drug injection—cocaine, novocaine, morphia. Under the latter, the administration of iron, arsenic, strychnine, aspirin, salicylate of soda, quinine, caffeine, belladonna, valerian, gelsemium, phosphorus.

Neuralgic patients invariably require feeding up; hence a liberal rich diet should be ordered along with oleaginous nutrients, such as cod-liver oil and linseed oil, or linseed cake for the larger animals.

NEURASTHENIA.

Before going into the question of treatment for this condition, it may be just as well to ask, Does neurasthenia, as it is understood in human medicine, really exist in the lower animals ? In the writer's opinion, it most assuredly does, although, of course, with nothing like such frequency as in man. Neurasthenia may be defined as nervous exhaustion and depression following upon some debilitating disease or factor which leads to derangement, and maybe starvation, of the nervous elements. The condition is most commonly seen in animals possessed of a highly sensitive nervous system. If the cause originates in disease or derangement of some organ or organs, remedial measures must be directed to their correction. Thus, prolonged indigestion may lead to malnutrition, which in turn brings about trophic nervous disturbance and neurasthenia; or saturation of the system with bacterial toxins—auto-intoxication—may be the cause. Overwork, a good example of which is to be found in stallions being put to too many mares, and the exhaustion, particularly noticeable at the end of the season, is also a contributing cause. Then, again, where the normal functioning of the skin is interfered with, in such conditions as diffused eczema or in parasitic mange, especially in the advanced stages, a phase of neurasthenia may be met with. Even in some animals suffering from lice, coupled with neglect and insufficient nourishment, the writer has detected neurasthenic phenomena. Lastly, feeding animals on foods markedly deficient in vitamins has been proved to produce neuropathic conditions leading to neurasthenia.

Having ascertained the cause and rectified it when possible, it is essential to give the patient a liberal diet and to bring it back as near the original state of its animal environment as practicable. Thus, horses should be turned out in good sound pasture, dogs shut up in kennels should be given ample scope to roam at large, and in the case of valuable pets a change of air may be advised. Medicinally there is a variety of drugs to draw from. As there is usually a sluggish liver and a torpid state of the bowels to deal with, laxative diet and medicine is called for. For the latter, small doses of aloes, calomel, salines, cascara, are indicated. Nerve tonics such as phosphorus, arsenic, salts of sodium and ammonium, and later on strychnine, are all useful. In the dog, glycophosphates, lecithin, neurosin, syrup of hypophos. co., are to be recommended. Where there are pronounced symptoms of much nervous irritability, the bromides of sodium and potassium tend to bring about relief.

Massage of the skin and friction applied by means of the body-brush are comforting to the nervous system and act as a general tonic, and the same remarks may be applied to galvanism.

NEURECTOMIES.

Resection of a nerve is carried out with the view of overcoming a degree of lameness when all other modes of treatment have failed. It must always be looked upon, therefore, as a last resort.

Median Neurectomy.—Resection of the median nerve may remove lameness proceeding from sprained tendons, splint chains, ringbones, ossification of the pyramidal process of the os pedis. The patient is cast on the side the limb has to be operated on, chloroformed, or a local anæsthetic may be used. The limb having been removed from the hobble, it is fixed by means of a crowbar driven into the ground if operated on out-of-doors, or to a ring in the wall if indoors. The limb is drawn well forward and outward. The hair is clipped or shaved and the skin painted with tincture of iodine, and a slightly oblique incision about 2 inches long made opposite the lower third of the elbow-joint in the close neighbourhood of the radial artery, which can be found pulsating, and which the operator should choose as his guide. The connective tissue, which is more in some animals than in others, is now dissected, exposing a portion of the pectoral muscle. This is cut through carefully in a line with the skin wound so that the underlying vessels may not be injured, blood-vessels are twisted, and the wound packed with gauze soaked in adrenalin, pressure being applied for a short time. Retractors are now adjusted to the lips of the wound and the edges drawn well apart. If the limb is in the right position, the corded nerve will now be found rolling under pressure of the finger at the bottom of the wound; but, if not, the limb should be moved slightly backwards or forwards to bring it into position. The next step consists of incising the fascia with a probe-pointed bistoury from below upwards. It only now remains to dissect the tissue surrounding the nerve to bring it into view. By means of a tenaculum passed under the nerve it is lifted from its bed, and with a blunt-pointed bistoury it is severed at the highest possible point. The nerve is then drawn upon and cut at its lowest point. The wound is now painted with tincture of iodine and sutured. Subsequent treatment consists in keeping the patient tied up for three or four days, dressing daily with a mild antiseptic for seven to ten days, the sutures being removed in about a week. Improvement in the lameness may be immediate or remote, and recovery may be partial or complete.

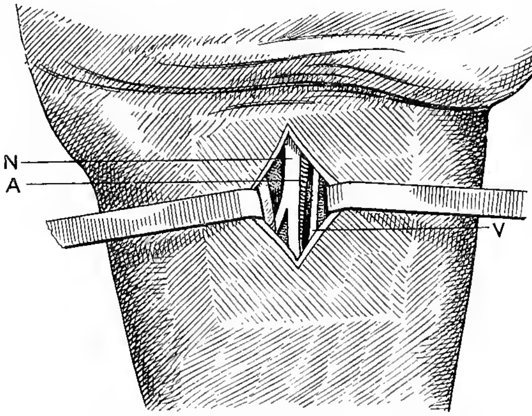

FIG. 95.—MEDIAN NEURECTOMY. (Semi-diagrammatic.)
N, Median nerve; *A*, posterior radial artery; *V*, one of the posterior radial veins.
(Dollar's "Regional Surgery.")

Plantar (Volar) Neurectomy.—This operation is divided into higher and lower neurectomy—*i.e.*, above and below the fetlock-joint. It may be performed in the standing or in the recumbent position—in the former, of course, by complete local anæsthesia. The writer must confess, however, he prefers to cast the patient, unless there is some very special reason for not doing so.

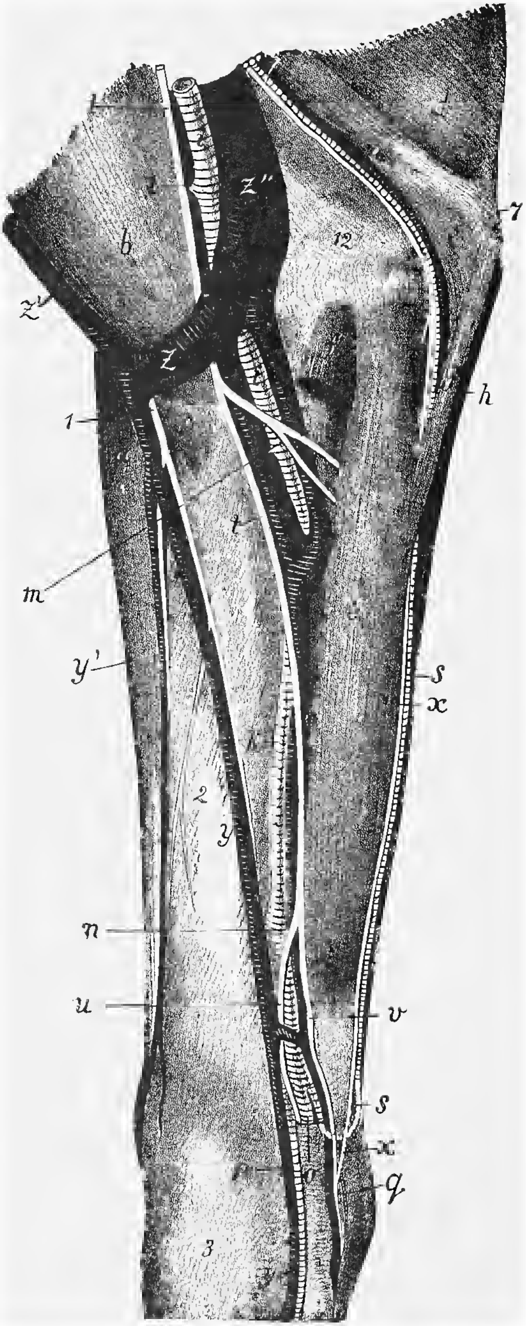

Fig 96.—Diagram showing Course of Median Nerve.
k, Radial artery; *s*, ulnar artery; *t*, median nerve; *x*, ulnar nerve.
(Dollar's "Regional Surgery.")

The object aimed at should be to make the smallest possible cutaneous wound under strict sterile precautions, so that it will heal by first intention, and to obtain this end the operation should be bloodless throughout.

Higher Operation.—The animal having been cast on the affected limb, which is now liberated from the hobble, a bandage is wound very tightly from the foot and extending nearly to the knee, the object being to press out venous blood. A tourniquet is then firmly applied at the top of the bandage, which is now removed and the leg straightened to produce a tense condition of the skin and a rigid state of the flexor tendons. In the groove between the posterior border of the metacarpal bone and the flexor tendons will be found the vein in front, the artery in the middle, and the nerve behind, the latter resting on the edge of the tendon. The site of operation is 1 to 2 inches above the sesamoid bone. The hair having been shaved and the skin sterilized, an anæsthetic is injected and an incision about ¾ inch long is made through the skin along the edge of the tendon, subcutaneous connective tissue dissected away, when

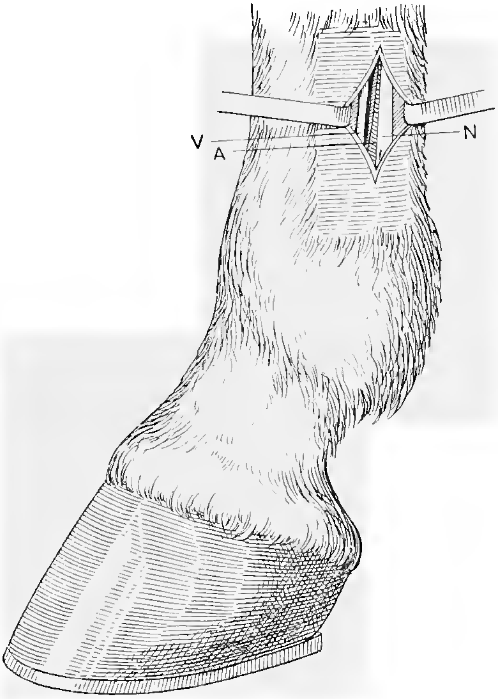

FIG. 97.—HIGHER NEURECTOMY.
V, Vein; *A*, artery; *N*, nerve. (Dollar's "Regional Surgery.")

the nerve will usually be brought into view. A tenaculum is now inserted under the nerve, threaded, withdrawn, and firmly tied. Withdrawing the nerve as far as possible from its bed, it is severed as high up as is practicable. The end is now pulled upon and cut at its lowest point, a piece of from 1 to 1½ inches being removed; the wound and its edges dressed with tincture of iodine, sutured, and painted with iodoform and collodium. The animal is rolled over, and a similar operation performed on the outside, but here the vein and nerve only are encountered. The internal and external plantar nerves having been resected, a pad of sterile cotton-wool is placed over each wound and bandaged, the animal allowed to rise and placed in a comfortable loose-box. If the operation has been aseptically carried out—and there is no reason why it should not be—the bandages should be left on eight or nine days, and by that time the wound will have healed. If suppuration is suspected, the dressings should be removed and the wound treated antiseptically, and any granulating tissue making its appearance cauterized.

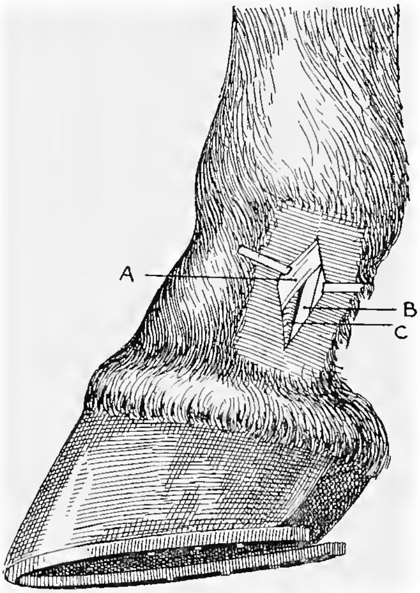

Fig. 98.—Lower Neurectomy.
A, Ligament of the ergot; *B*, digital nerve; *C*, digital artery.
(Dollar's "Regional Surgery.")

Lower Operation.—This operation consists of resection of the posterior branch of the volar nerve as it passes over the lateral aspect of the pastern-joint, the technique being similar to that carried out in higher neurectomy. The lower operation can only be beneficial, however, in those cases where lameness proceeds from the posterior aspect of the foot, and by reason of its limitation it is seldom carried out in practice.

Indications for Plantar Neurectomy.—When all other methods of treatment have failed and the horse as an economic proposition is useless, neurectomy may be performed, provided (1) that there is no advanced organic disease of the foot or severe contraction of the tendons; (2) that the animal is not used for hunting; (3) that ankylosis of the fetlock or pastern-joints is non-existent, or, if so, only partial.

Sequelæ.—The operation should not be performed until the surgeon has fully acquainted the owner of the risks entailed. Sloughing of the hoof due to trophic causes comes first in importance; nevertheless, horses have worked for years before this condition has developed. The blacksmith, in shoeing the animal, should be informed of the fact that there is no sensation in the foot, so that all risks of pricking or even "hoof-bound" may be carefully averted. By reason of the fact that all sensation has been destroyed, the horse is liable to exert more pressure on the affected limb than he would otherwise do if sensation were present; consequently, the tendinous or ligamentous structures are liable to give way under great pressure. Needless to add, should any of these conditions arise, the animal must be immediately destroyed. If no improvement follows the operation, and there is free movement of joints and tendons, the seat of lameness is certainly not below the operation site, in which case a mistaken diagnosis must be confessed. Should the practitioner, therefore, entertain the slightest doubt upon his diagnosis, he should, before deciding to unnerve, anæsthetize the plantar nerves.

Peroneal Neurectomy.—This operation was brought into notice by Bosi for the treatment of bone spavin. It consists of resecting the tibial nerve. The skin is sterilized in the usual way, and an incision about 3 inches long made opposite the external margin of the extensor digitorum longus muscle, which is separated from the tendinous and muscular portion of the flexor metatarsi, on the anterior surface of which the nerve will be found and a piece $1\frac{1}{2}$ inches long removed, and the wound sutured (Dollar). In like manner the posterior tibial nerve is removed. About 4 inches above the point of the hock on the inner aspect, 1 inch in front of the tendon of Achilles, the nerve may be detected by manipulation between the finger and thumb. An incision is here made in the skin 2 inches long, parallel with the tendon, and the subcutaneous tissue divided, the underlying fascia removed, and the nerve brought into view, which is picked up and a piece removed in the usual way. The wound is then sutured. The double operation, owing to danger of sloughing, is not recommended (Dollar). Tibial neurectomy, however, does not seem to hold much favour in this country.

NEURITIS.

This condition may be traumatic or constitutional. In the latter case, it is seen as a sequel to bacterial infections such as influenza and strangles in the horse, distemper in the dog. A purgative is always advised at the outset. Hot fomentations and cooling anodyne lotion over the course of the nerve or nerves relieve tension and reduce pain. Subsequent treatment consists of giving a course of salicylate of soda or aspirin, bromide of sodium, chloral, formamide, potassium iodide. Later phosphorus, arsenic, iron, strychnine, quinine, and such nerve tonics, may be tried. When the acute stage has been reduced, gentle massage and galvanism may be tried. In obstinate cases, blisters applied over the area and prolonged rest are indicated. If these fail, the actual cautery is advised. Neuritis being a lowering disease, the patient should have an abundance of rich nutritious food, especially oleaginous.

NEUROMATA.

Tumours found in association with nerve elements common in man are very rarely seen in animals, and then only at the seat of a neurectomy. Where they are causing no inconvenience, they should be left alone. If their removal is decided upon, this is a simple matter. The seat of operation is anæsthetized, the skin cut through and the tumours exposed, the nerve attachment severed and the growth dissected out, the wound being closed and treated in the usual manner.

N'GANA (pron., Nagana).

An African trypanosomiasis or blood disease due to the presence in the circulation of varying species of trypanosomes. Originally the term was restricted to infection by the *T. brucei*, a disease produced by the bite of a species of fly of the genus Glossina (or tsetse fly), the *Gl. morsitans*, which in its turn becomes infective only after sucking the blood of an animal harbouring the organism in its circulation. Such a disease-carrying animal may be in a state of acute infection, or may, as a chronic "carrier," be merely the passive reservoir of the disease, tolerating the presence of the trypanosome in its blood and resisting its pathogenic action. This tolerance or refractory state is probably established by lengthy and sustained association with the disease-producing organism rather than by an immunity of a strictly racial character, and in this latter way various species of wild animals—chiefly of the deer and buffalo tribe—perpetuate the disease by their capacity to maintain the infective germ, the trypanosome, in their circulatory systems, from whence the vector or fly is able to obtain it and, either by direct transmission or after a developmental phase, convey the disease to another host, which, if susceptible, becomes acutely infected by the trypanosome and rapidly succumbs to the same.

All the domestic animals are susceptible to infection, but fortunately man himself, although liable to the attack of the fly, is not susceptible to the disease in question.

From the foregoing it will be seen that n'gana is a disease existing, broadly speaking, only in districts where big game exists, and observation and experience has shown that the fly follows the migrations of these wild animals, its permanent hosts (see Tsetse Fly).

Although the disease cycle in the infected susceptible animal runs a course of varying duration (dependent upon racial and individual susceptibility), the issue is almost invariably fatal. In local South African parlance the "fly-struck" animal rapidly emaciates, general signs of ill-health, fever, œdematous swellings, and skin eruptions preceding death from exhaustion.

Treatment is rarely attempted, but much laboratory work has been directed to the cure of the artificially infected animal. Arsenious acid has been shown to exert a restraining effect upon the disease course if used in massive doses, although animals habituated to large doses of the drug prove non-resistant when exposed to the infection. Dyes of the benzo-purpurin series have also been shown to produce a temporary amelioration of the disease, and cause the disappearance of the organism from the general circulation for a time. More recently antimony has shown the possibility of modifying the course of the infection, but all such work, including much endeavour on the part of the serologist, is still in its experimental stage.

Prophylaxis is sought by avoidance of known infested areas—"fly belts"—or, as these latter are generally well defined and of small extent, by their traversal during the hours of darkness while the tsetse fly is quiescent.

Smearing the ox or horse with dung of any sort is resorted to by the natives, and some transport riders have observed, as Livingstone did before, the aversion of the fly to excremental matter.

Rapid travel during the hours of darkness, however, is the usual method of avoidance of the infection, and this method has been successfully employed, not only by the transport rider and traveller, but by long military columns, which have in this way, by a rapid night trek, escaped without the occurrence of a single case of the infection.—*H. Watkins Pitchford.*

NORMAL SALINE SOLUTION.

The therapeutical value of normal saline solution, in the writer's experience, cannot be overestimated. It may be used in almost every disease, for it has the great advantage in the fact that, if judiciously applied, it cannot possibly do any harm, and may be fraught with much good. As a lymphagogue combined with citrate of soda it is a valuable and far-reaching agent; as an eliminative, particularly in auto-intoxications, it exerts a powerful and rapid influence; as a cardiac tonic its effects are immediate; as a circulatory stabilizer, it counteracts shock and sustains life after severe hæmorrhage. It may be used in such diverse conditions as colic, pneumonia, congestion of the lungs, blood-poisoning, jaundice, distemper, influenza, hyperæmia, anæmia, fatigue, hæmorrhage, sunstroke, collapse, etc.

The strength of normal saline solution is 75 grains of sodium chloride to a pint of boiled water; roughly speaking, a teaspoonful to 20 ounces. A compound saline solution is composed of sodium chloride, 25 grains; sodium carbonate, 1¼ grains; sodium sulphate, 1¼ grains; sodium phosphate, 1 grain; potassium chlorate, 1½ grains, in ½ pint of distilled or boiled water.

The above solutions may be injected subcutaneously, intravenously, or intrarectally.

Subcutaneous Injection.—This is carried out by means of a funnel or other vessel attached to which is a long piece of rubber tubing—4 to 8 feet—the free end being armed with a sharp-pointed needle, which is inserted under the skin, usually in the scapular area. After filling the vessel with the solution, it is raised as high as possible and the fluid allowed to gravitate into the subcutaneous tissue. This is, however, a slow and tedious process for large animals, and the writer has for some years used an oversized syringe of the human enema type to which is attached a bayonet-pointed needle of large calibre, and by this means a gallon of fluid can be injected in a very short space of time. The needle and syringe should be clean and the skin at the seat of puncture sterilized as an ideal procedure; nevertheless, it must be confessed, the writer has done a very large number of injections where the water to make the solution, the needle, the syringe, or the skin, have not been sterilized, and he has never yet in the horse and ox noted any untoward results. It is advisable, however, to exercise greater care in the dog and cat.

The quantity for the horse and ox is usually 4 to 8 pints; for the dog, 10 to 20 ounces; and for the cat, 2 to 6 ounces. The temperature of the solution should be 102° to 104° F. In addition to the solution, such agents as brandy, ammonia, proflavine, permanganate of potash, etc., may be added, as the particular case may require.

Intravenous Injection.—Where immediate results are aimed at, injection directly into a vein is advised, but here the greatest care must be exercised. The funnel, tubing, and needle, *must be sterile*, and it is advisable to use the saline in tablet form with the regulated strength.

In the horse and ox, the jugular vein, by reason of its situation, is the one usually chosen at a point half-way down the neck; and in the dog and cat, the thigh vein. The skin is shaved and sterilized with tincture of iodine or Lysol. The funnel and tube is filled with the solution to express the air. The vein is raised with the finger or by a cord held tightly round the neck, and the needle plunged through the skin and vein wall in a slanting and downward direction. If blood flows from the needle, the point has entered the vein, and should be immediately adjusted to the flange at the free end of the tube, then by turning the stopcocks the solution is allowed to flow *slowly* into the vein, all pressure, of course, being removed from the vein.

The quantity injected really depends upon the condition from which the animal is suffering, but as a rule 2 to 4 pints may be injected into the horse and ox, 4 to 12 ounces in the dog, and 2 to 4 ounces in the cat. The solution should be as near blood-heat as possible.

Intrarectal Injection.—The injection of normal saline solution into the rectum may be carried out in all animals by means of an enema syringe attached to which is a stout flexible tube, so that the solution may pass as far as possible into the bowel. The therapeutical action here is slower and more remote than by the two preceding methods.

NYMPHOMANIA.

Abnormal sexual appetite is occasionally seen in the lower animals, the greatest victim being the cow. It is due to some irritable condition of the generative organs, largely the result of organic derangement, and before treatment can be successfully undertaken the cause must be ascertained. Thus, the ovaries may be diseased through inflammatory deposits, tumours, cysts. The mucosæ of the Fallopian tubes, the uterus, the vagina, may be in a constant state of chronic catarrh, either with or without the presence of neoplasms, malignant or benign. Lastly, the clitoris may be the root cause.

Treatment, therefore, covers a wide range. If the ovaries—or, in the male, the testicles—are at fault, their removal is imperative (see Ovariotomy). If the mucosæ are in a state of irritable catarrh, vaginal douches combined with pessaries, and constitutional treatment by means of salines and alkalines, with ergot, coupled with the hypodermic injection of pituitrin, should be given a trial. If tumours are present, their removal is called for. If the clitoris is at fault, *clitoridectomy* should be performed. This is a simple operation. The animal is spanned above and below the hock, bulldogs inserted in the nose and firmly held, the tail drawn to one side by an assistant, a suture passed through the apex of the organ, and pulled outwards and dissected from its base. The resulting wound is dressed daily for a few days.

In obscure cases where the origin cannot be located, ovariotomy should be performed (see Ovariotomy). The removal of the ovaries produces an atrophic condition of the generative organs, reduces in size tumours, counteracts catarrhal conditions, and quietens the excitable temperament of the patient.

In a dairy a nymphomaniac cow is a perfect nuisance; it should therefore be separated from the herd.

OBESITY.

Excessive fat may be divided into normal, or healthy; abnormal, or unhealthy. Many animals carry an excess of fat, eat moderately, and remain in sound healthy condition. Cases such as these should be left alone. When an animal, however, is soft and flabby, breathes or pants rapidly on the slightest exertion, means should be devised to correct the condition. Dieting is of paramount importance from a quantitative and qualitative point of view. The animal should be put on the smallest rations compatible with good health, and those food constituents which are known to produce fat withheld; these are, of course, fats and carbohydrates. It is also important that the water supply should be cut down to a minimum. It is really surprising how animals lose in condition when placed on restricted water ration. Steady and gradual increase of exercise or work also forms part of the treatment. Medicinally a full purgative dose should be given at the commencement and repeated at intervals, salines being best for the purpose. Courses of sodium sulphate, citric acid, and potassium nitrate are also recommended. In obstinate cases, particularly in dogs, thyroid extract in 3 to 5 grain doses night and morning may be tried, but this drug should not be pushed too far.

ŒDEMA. *See* Anasarca.

ŒSOPHAGOTOMY.

Operation on the gullet can only be undertaken in the cervical region, and should be performed when all other means of removing foreign bodies or obstructive material have failed. It is preferable to operate on the patient in the standing position, the animal being restrained by the twitch in the case of the horse, and bulldogs in the ox. The seat of operation, on the left side, having been chosen, which of course is over the foreign body, the hair is shaved, the skin painted with tincture of iodine, and a local anæsthetic injected.

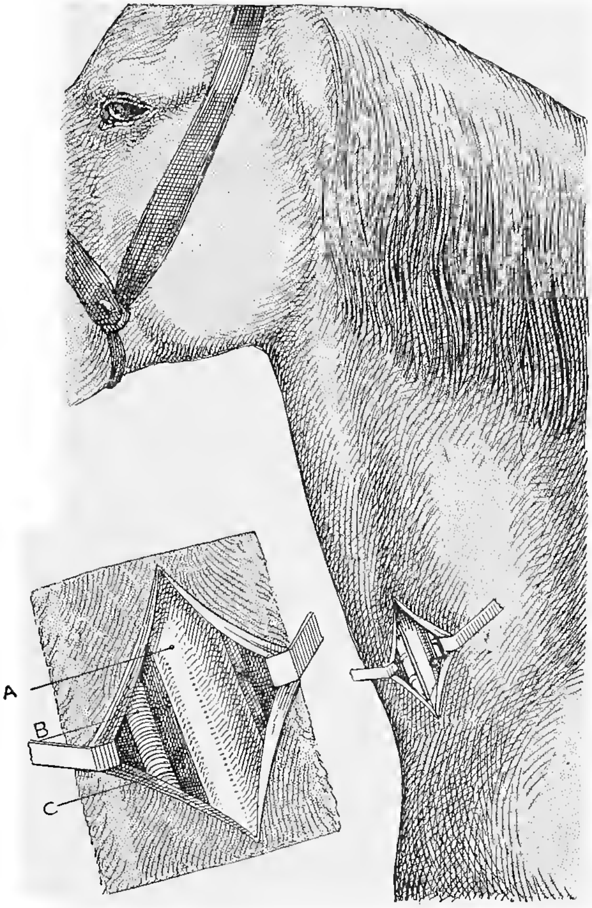

FIG. 99.—ŒSOPHAGOTOMY: SEAT OF OPERATION.
A, Œsophagus; *B*, carotid artery; *C*, trachea.
(Dollar's "Regional Surgery.")

The skin is incised parallel with the jugular furrow, the length of the wound depending on the nature and extent of obstruction. The fascia and subscapulo-hyoideus muscles are then cut through, the connective tissue is broken down by digital manipulation, the jugular vein being forced upwards, and so also the carotid. The gullet is then grasped with the fingers and drawn outwards. If the foreign body is soft or comparatively so, efforts should be made by pinching to break it down; or, if doughy, by separating the mass by pressing between the finger and thumb. This method may be assisted by administering a little linseed oil. Should the operator succeed in breaking down the mass—although it must be confessed that this is not often successful in practice—the probang should then be passed and attempts made to force the contents into the stomach.

If this fails, the next step consists of cutting through the œsophageal wall by a longitudinal incision, and removing the mass in pieces. The mucous coat is then sutured with catgut, next the muscular, while finally one suture should be inserted in the upper third of the cutaneous wound, a drainage tube being secured in the lower third, and through this the wound is irrigated daily with a mild antiseptic. Healing is usually tardy, but the smaller the œsophageal wound, the quicker, as a rule, the recovery. The animal should have nothing for thirty-six hours at least, after which time normal saline solution to which proflavine, permanganate of potash, or boric acid has been added should be given to drink at intervals. The following day, in addition, milk, eggs, hay tea, and oatmeal gruel should be ordered. Nutrient enemas, if necessary, may also be ordered. No solid food should be allowed for several days, and then it should consist of bran, linseed, oats in mashes, and a very little steamed hay or grass. Recovery is usual in two or three weeks.

ŒSOPHAGUS, DISEASES OF.

Constriction.—Stenosis of the gullet may follow a variety of causes: thus, (1) injuries to, and wounds in, the mucosæ, followed by cicatrization; (2) pressure from without by neoplasms, abscesses, or enlarged mediastinal and bronchial glands; (3) temporary spasm of the muscular elements of the œsophagus.

1. If the patient is valuable, a series of various sized probangs, freely lubricated, should be passed down the gullet—beginning with the smallest—two or three times daily. If food is lodged anterior to the stricture, before passing the probang it is advisable to administer a little linseed oil to facilitate its removal, and the animal allowed to drink, or water may be given as a draught to clear away all the ingesta.

2. Unless these tumours are situated in the cervical region, which is indeed rare, treatment is of no avail. Where they can be operated on, surgical removal is indicated.

3. Treatment here will be found under Spasm of the Œsophagus (which see).

Dilatation.—Treatment is as a rule unsatisfactory. If the case is of recent origin and slight in character, the animal should be put upon a course of rich sloppy foods, but in ruminating animals this cannot be persevered with too long, owing to the fear of digestive troubles setting in. Should improvement follow, better results will be obtained by turning the animal out to grass than keeping it indoors and feeding on dry food. As a last resort, cutting down upon the diverticulum—if it is situated in the cervical region—and removing an elliptical piece of mucosa may be tried (see Œsophagotomy).

Obstruction.—See Choking.

Œsophagitis.—Inflammation of the œsophagus seldom exists as a primary condition, save in those cases which are the result of direct injury. Where it is due to the action of irritant poisons, invariably the larger issues at stake, such as gastritis or enteritis, would entirely obliterate in importance the œsophageal condition. If the condition is due to injury, treatment is far from satisfactory, but antiseptic draughts mixed with ice water, repeated often, may be tried. If the cause is a poison, the suitable antidote is called for, and mucilaginous draughts such as linseed oil and linseed gruel administered; these may be combined with the white of eggs and lime water. Hot fomentations should be applied along the left side of the neck.

Paralysis.—This condition is usually seen in conjunction with paralysis of the pharynx. The origin of the paralysis may be central, in which case it is often progressive and usually incurable; or it may be peripheral, and more amenable to treatment. As a rule the practitioner finds his patient choked, the foreign body being usually accumulated soft masticated food. This must first of all be got rid of by the usual method of unchoking. This successfully accomplished, the danger of repeated choking must be warded against by placing the animal on a sloppy liquid diet for a considerable length of time, and, if necessary, rectal feeding should be practised. The neuro-muscular elements in the cervical region of the neck can be stimulated by applying at intervals counter-irritants, and a course of nerve tonics prescribed, such as nux vomica, veratrine, or the hypodermic injection of strychnine.

Spasm.—This is usually of a temporary character, but while the spasm lasts the symptoms are somewhat alarming. A hypodermic injection of morphia and atropine should be given at once, and if there is an accumulation of food in the gullet, a little oil may be administered. All food must be withheld for twenty-four hours, and then sloppy food ordered for a day or two. Massage along the gullet may also be practised with benefit.

OFFSPRING, ATTENTION TO.

In the wild state the offspring requires no attention, save that supplied by the mother on the impulse of her maternal instincts. The trend of civilization and consequent environment has, however, produced an artificial existence requiring the assistance of man in the shape of guide and pilot to the new-born.

The fœtus may be born enveloped in its fœtal envelopes, and unless it liberates itself by struggling or by man's timely assistance, death will follow. It may be born in a weak and exhausted condition, often the result of prolonged labour or maternal weakness and debility, requiring stimulation by means of artificial respiration. To attain this object, various methods are carried out in practice: Grasping the tongue by means of a cloth, and pulling it out and allowing it to recoil, repeating the process for some time—at the same time an attendant is instructed to raise and lower the uppermost front limb, keeping in harmony with the tongue movement; applying friction all over the body, particularly in the region of the heart; raising and lowering the hind limbs so that the blood flows to the brain. In the case of calves, licking by the mother serves as Nature's natural stimulant. If the offspring is unable to rise, it should be given its mother's milk a little at a time and repeated often. In those cases where the navel cord does not rupture, it should be torn or ligatured with sterile cord, cut, and the stump dressed with an antiseptic. In some cases, especially in primiparæ, the mother has little or no milk, in which case a foster should be supplied. In other cases in multiparous animals there may be more offspring than the mother can rear; here also foster help is needful.

In all offspring, it is of first importance to see that it has the mother's first milk, the natural laxative effect of which removes from the bowels meconium, and wards against gastro-intestinal derangement.

Where animals are delivered indoors, the floors should be clean and bedded with wholesome litter. If the weather is seasonable, however, delivery out-of-doors in the case of farm animals is much the best. Over-officiousness at, or immediately after, delivery on the part of the attendant cannot be too severely condemned. Finally, if a mare is allowed to foal out-of-doors, care should be taken to fence off water-ways and water-pits. Many foals have been drowned by failing to take this necessary precaution.

OMASUM, DISEASES OF.

Inflammation.—It may be safely presumed that disease of this organ of a primary character is not seen in practice, and any inflammatory condition present must be looked upon as an extension from the rumen reticulum, or abomasum. An accumulation of ingesta is always present, and this must be removed by the administration of laxatives such as linseed oil, treacle, small doses of sodium sulphate, followed by neuromuscular stimulants, ammonium carbonate, and nux vomica. The patient should have an abundance of bran, water, and linseed tea to drink, and thirst stimulated by placing common salt in the mouth at intervals. The application of a strong mustard plaster over the omasal region is also recommended. If the temperature is high, small doses of aconite combined with full doses of sodium bicarbonate is advised.

Impaction.—Here treatment is similar to that for omasitis, but the measures adopted may be more heroic. Thus, full doses of sodium sulphate should be given along with larger doses of linseed oil and treacle, combined with carminatives, ginger, and aniseed, alternated with aloes and nux vomica. Further, the hypodermic injection of eserine and pilocarpine may be given a trial. When the animal has obtained relief, a carefully selected diet should be prescribed, consisting of boiled linseed, sloppy bran, scalded oats, steamed hay; and to prevent a recurrence, occasional doses of treacle, sodium bicarbonate, and sodium chloride, are indicated.

OPACITY, CORNEAL.

If the case is one of recent origin, the patient should have a purgative dose, followed by a course of vegetable and mineral tonics. Locally the eye is irrigated two or three times a day with cold water by means of a hose-pipe, after which nitrate of silver lotion (2 grains to 1 ounce of distilled water) should be instilled between the lids. Later on calomel in fine powder may be dusted on to the eyeball once daily. Weak nitrite of mercury ointment painted on the fore edge of the eyelids is also useful.

OPHTHALMIA, PERIODIC.

Treatment here is largely palliative. The patient at the outset should have a brisk purgative and placed in a darkened hygienic box. The eye, after fomentation with hot boric lotion, is dressed with the following night and morning:

℞	Atropinæ Sulphatis	grs. ii.
	Zinci Sulphatis	grs. v.
	Aquæ Dest.	℥i.

M. Ft. collyrium.

If the case remains obstinate, a seton should be inserted at the side of the orbit or a biniodide of mercury blister may be applied, and the patient tied up to the rack for three or four days.

Recently auto-vaccination has been tried, but it is too early to say with what results.

OPHTHALMIA, SIMPLE.

This condition usually runs a very acute and painful course. Blood-pressure is lowered by bleeding from the eye vein or applying leeches and administering a bold purgative to which is added calomel. The patient having been placed in a darkened atmosphere, the eye or eyes are bathed with weak boric lotion, after which a collyrium composed of atropine 2 per cent. should be applied two or three times a day after bathing with an infusion of camomile leaves. When the acute stage has been reduced, weak nitrate of silver lotion (3 grains to the ounce) may be applied; and if the eyelids tend to adhere, consequent upon the discharge, a little weak yellow oxide of mercury ointment should be applied to the edges by means of a camel-hair brush night and morning. In those cases where the ophthalmia is due to the presence of a foreign body, this must be looked for and removed with as little damage to the eye as possible. The question of sympathetic ophthalmia in some cases must not be lost sight of; and where there is the slightest indication of extension to the healthy eye, the surgeon must not delay the surgical removal of the diseased one. Fortunately, however, this condition is very uncommon in the lower animals. In those cases following or running concurrently with such debilitating diseases as influenza or strangles in the horse and distemper in the dog, the surroundings should be sanitary and the diet rich and nutritious, while a course of tonics should be administered.

ORCHITIS.

Inflammation of the testicle is usually seen in practice as the result of an injury. Tension of the organ can be considerably reduced by administering a full purgative dose and placing the patient on low diet. If there is a temperature, febrifuges are indicated. Locally, the organ should be fomented and anodyne belladonna liniment applied. If the tension remains considerable, the scrotal skin is sterilized with tincture of iodine and several deep punctures made into the organ with a sterile lancet. Where the case leads to suppuration, on the first indication of pus lancing should be practised and the cavity irrigated daily with a mild antiseptic. Should hydrocele develop, tapping is indicated (see Hydrocele). In severe and obstinate cases, castration is advised.

ORGANOTHERAPY.

The introduction of extracts from the so-called ductless glands into practical medicine, although of recent origin, may be fraught with much future—if speculative—possibilities. There are a few, however, which have by time and clinical data proved themselves worthy of therapeutical consideration. Chief of these are:

Pituitary Extract.—Derived from the posterior lobe of the pituitary body, it exercises a specific action on the unstriped muscles of the bladder, uterus, and bowels, and raises blood-pressure by contracting the arterioles. It is therefore useful in uterine inertia, uterine atony, uterine hæmorrhage. By acting as a vaso-constrictor and diuretic, its use is indicated also in œdema. By raising blood-pressure, it should be useful in shock and collapse. As it appears to be non-toxic, the extract may be used often.

Dose: Horse and ox, 2 to 3 drams; sheep and pig, 20 to 30 minims; dog, 10 to 20 minims.

Suprarenal Extract.—Adrenalin is an insoluble crystalline body. It is usually prescribed dissolved in a 1: 1,000 solution of the hydrochloride. It accelerates the heart's action, constricts the plain muscle of the arterioles, increases salivary secretion and stimulates the muscular coat of the pregnant uterus. It inhibits the bronchial muscles, gall-bladder, stomach, and bowels, but contracts the sphincters. It is a powerful local and systemic styptic. Locally it is applied to the bleeding area by means of gauze soaked in the solution, usually in 1 per cent. to 1: 1,000. Injected subcutaneously, it is of great use in hæmorrhage. It has also been prescribed by practitioners in such diverse conditions as milk fever, laminitis, purpura hæmorrhagica, redwater, azoturia, collapse, shock, etc.

Dose—hypodermic solution: Horse and ox, 1 to 3 drams; sheep and pig, 5 to 20 minims; dog, 3 to 10 minims.

Ovary and Testis, Extracts of.—Extracts of these have been prescribed from time to time for a number of generative and nervous diseases, but more research work appears to be done before their therapeutical value becomes established.

Thymus Extract.—This extract has been used experimentally upon animals backward in growth, and there is every indication to look hopefully to the future use of this therapeutical agent. At present, however, it is only in the experimental stage.

Thyroid Extract.—The oldest of animal glandular extracts, it is derived from the thyroid gland of the sheep. It has been proved to stimulate the growth of young animals, the generative organs, and activate metabolic changes. It was originally used in myxœdema in man. It is now also prescribed in eclampsia and for obesity. Owing to its action upon the heart, it should be used with care.

Dose: Dog, 3 to 5 grains night and morning, and after a time the dose may be gradually increased.

OSTEOMALACIA.

It would appear that the predisposing cause of this disease, if not the actual one, is elemental dietetic deficiency, and is more common in certain countries and localities than in others. A complete change of diet is therefore of first importance. Law recommends common salt and a liberal supply of bone meal, combined with such tonics as iron, gentian, nux vomica, quinine, and such nutrients as cod-liver oil and malt extract. In addition to these, lime and phosphorus salt are worth trying. In human medicine the injection of adrenalin has given good results, and this line of treatment might be tried in animals. In all cases where a drain on the system exists, such as in pregnancy, artificial abortion may be tried, or, in the case of milch cows, cessation from milking. In severe cases ovariotomy might be tried.

OSTEOPOROSIS.

As with osteomalacia, the pathology of this condition is obscure, and treatment, therefore, must be along somewhat empirical lines. The principles laid down for the previous disease may be tried here.

OSTITIS. *See* Bone Diseases.

OTITIS.

This condition is most commonly seen in the dog and cat. The following treatment has given the writer the best results: Having inserted a few drops of warm almond oil into the ear, the base is manipulated between the finger and thumb for a short period. The ear is then swabbed out by means of a piece of cotton-wool wound round a small pair of artery forceps, the swab having been previously soaked in peroxide of hydrogen. This process is continued until all pus, scab, and wax have been removed. An ear speculum is now inserted with the object of ascertaining the exact state of the membrane and skin. If there is no ulceration present, an ear bougie composed of iodoform and boric acid is inserted daily and the ear swabbed dry every two or three days. If ulceration does exist, swabbing daily with silver iodide solution is advised. If this fails, 1 dram of tincture of iodine dissolved in 4 drams of glycerine may be tried every second day. Should this method not bring about resolution, the ulcer or ulcers may be *lightly* touched with lunar caustic and a traumatol bougie inserted daily. Sporting dogs must be prevented as much as possible from going into water while the disease exists.

OVARIES, DISEASES OF.

Oöphoritis.—This condition may occur in any of the domestic female animals, although it is not very common. If the case is one of recent origin, bleeding and purgative treatment should be tried and the irritability reduced by giving a course of such drugs as belladonna, chloral hydrate, hyoscyamus, or in more urgent cases the hypodermic injection of atropine and morphia. Counter-irritants applied to the loins may also bring about some relief. Where this line of treatment fails and the patient still remains an irritable and excitable nuisance, ovariotomy should be performed.

Ovarian Cysts.—In the larger animals, recovery may be brought about by bursting the cyst under pressure. The rectum is emptied, and the cystic ovary reached by the right hand and pressed against the abdominal or pelvic wall until the cyst gives way. In some cases where the wall of the cyst is attenuated this is an easy matter, in others considerable pressure is required. The fluid, which is usually sterile, escapes into the peritoneal cavity and becomes absorbed. By this method the patient often becomes normal and even fertile. The alternative to this method is ovariotomy.

OVARIOTOMY.

The removal of the ovaries is practised on all domesticated animals, and the veterinary specialist in this operation may even be called upon to operate upon such outside species as monkeys and badgers, in order to make them more endurable or amenable as pets in the household.

In the mare, it is usually done as a cure for vice or excessive irritability and squeamishness, and, if done early, before the vice has become a confirmed habit, it will convert a high proportion of squealing, urinating brutes into useful and docile animals.

In the calf, the operation used to be done quite commonly in certain counties of England in order that they should fatten more quickly, but for some reason or other it has dropped almost into disuse; in the milking cow it has been advised in large dairies in order to prolong the period of lactation, to obtain a continuous and regular milk-supply, and to improve the quality of the flesh for beef purposes.

Cows of eight or nine years old are generally the subjects selected, and it is asserted that the flesh, when the animal is fat, is like that of steer beef. Operated upon about six weeks after calving, when giving the maximum quantity of milk, this supply is continued without any break, owing to absence of œstral derangements, for an average period of from fifteen to eighteen months; and when the amount drops to below a paying quantity, the cow only needs cake and other fattening foods for about a month to become fat and ready for the butcher.

The milk, too, is stated to be richer in butter-fat, and in Switzerland, where many thousands of cattle have been "spayed," special classes are set aside in the fat-stock shows and exhibitions for "spayed cattle," as the ordinary animals cannot compete with them for size, weight, and general appearance.

Both in the mare and the cow the operation may be performed through the flank or the vagina. On the large ranches and cattle farms in America and Australia the flank method is the one most universally used: the animals are lassoed and tied up or merely driven one by one into a "crush" (a narrow space between rails), where they are securely fixed and somewhat crudely operated upon without any anæsthetic or other preparation than a rough wash with soap and water containing some antiseptic.

The hair may or may not be clipped off; the incision is made in the left flank just under the angle of the ilium, the operator inserts his hand, withdraws the ovaries and removes them with an ecraseur. Two or three sutures are inserted, and the animal is allowed to go back to the prairie, receiving no further attention. It is stated that the percentage of fatalities, even under these crude surgical conditions, is very small.

Under more civilized conditions the vaginal method of operating is preferable, where the size of the passage will permit of the introduction of the hand.

The mare can be done in the standing position, chloral first being administered as a narcotic and the animal secured in stocks, or the patient can be cast and chloroformed. The writer prefers the latter method.

The cow is done in the standing position. The general directions for each are the same. After the vagina has been washed out and swabbed with antiseptic, the operator introduces his hand containing a Colin's obstetric knife with the edge of the blade protected, and presses it into position against the upper portion of the wall of the vagina just above the os uteri. He then waits for an opportunity when the wall is tense and makes an incision sufficiently large to admit the middle finger. The knife may then be withdrawn or allowed to fall on the vaginal floor. The incision is enlarged with the fingers held in the form of a wedge until the whole hand passes into the abdomen. In the cow the insertion of two fingers is usually sufficient to hook up each ovary in turn and withdraw it into the vagina, where it can be readily reached and removed with the ecraseur. In the mare this is not generally possible, the chain of the ecraseur being passed right through the vaginal incision into the abdomen. Having then passed the hand into the abdomen, the operator readily finds the uterus and traces along each horn to the ovary.

Here a word of warning must be given that the operator shall not mistake a lump of fæcal matter in the bowel for ovary. Having grasped the ovary and pulled it as near to the vagina as possible, the ecraseur is passed in, using the arm as a guide, and the ovary is manipulated until it is passed through the loop of ecraseur chain. Then, after making sure that nothing else is present, it is excised, being retained in the hand and finally withdrawn.

The second ovary is removed in the same way; the vaginal incision is cleansed with antiseptic, and the operation is completed.

For a few hours afterwards the animal may show a little vaginal irritation, and there may be signs of colic, but as a rule there is nothing to necessitate treatment, and the recovery of the patient is uneventful.

Untoward sequelæ to be feared are those of internal hæmorrhage, prolapse of the intestines, peritonitis, and abscess of the vagina, but, given care and antiseptic precautions, the percentage of deaths is very small.

Of the smaller domesticated animals, sheep and goats are now very rarely operated upon, but the pig is done as a matter of regular routine in some districts, usually by the ordinary gelder, and it is astonishing how expert these men become.

The operation is done in the left flank, the operator placing one foot on the pig's neck and having the hind leg held back in such a way that the flank is well exposed. No antiseptic precautions are taken, no anæsthetic is used, and on numerous occasions the writer has seen the ovaries and uterus of female pigs removed and the incision sewn up within thirty seconds. It is quite a rarity for a death to occur.

Older sows are occasionally done, the operation being performed under chloroform through the flank, and the ovaries removed with an ecraseur or by the aid of the clam and iron.

The bitch and cat are very frequently unsexed on account of the nuisance to the owner during the œstral period. An anæsthetic is always given. The cat is preferably operated upon through the left flank, but the operator may take his choice of this situation or the median line for the bitch. The skin is prepared in the usual way and then incised, the muscles are cut through by the aid of a scalpel and director, and with the middle finger the ovaries are sought for and withdrawn. If of any size, they are ligatured before excision, but in a small, young animal they are merely scraped or pinched off. Some operators prefer always to remove the whole of each horn of the uterus and a small portion of the body, and from the results obtained there appears to be no more risk than if the simpler operation alone is done. The abdominal wound is then sutured, the muscle with silk or catgut and the skin with silkworm gut. The daily application of iodine is all that is necessary, and the sutures may be removed in about a week.

Monkeys are done through the median line in very much the same way as the bitch, but the ovaries alone are taken away.

Given ordinary surgical care and attention to antiseptic details, the proportion of deaths as a sequel to ovariotomy in the domesticated animals is infinitesimal.—*Frederick Hobday.*

OXYGEN—ITS USES.

The gas is supplied in strong metal cylinders which are provided with a metal stopcock and a piece of rubber tubing. Oxygen is used principally in veterinary practice for pulmonary and cardiac affections. A mask or towel is placed over the nostrils, into which the end of the rubber tubing is passed, and the screw of the cylinder tap slightly turned so that a *slow* volume of gas escapes. In severe cases, the inhalation should be prolonged and repeated often. In acute lung affections, the inhalation of oxygen, especially if nearing the crisis, may be the means of warding off dissolution. It is particularly useful where symptoms of cyanosis develop. The gas is not used as much in comparative medicine as it should be, and now that all hospitals stock it, even in small provincial towns, the practitioner should experience no difficulty, even in emergency cases, of securing a cylinder.

PAIN.

From a humanitarian and also from an economic point of view, it is the first duty of the practitioner to overcome as far as possible animal suffering. When the tissues are so far damaged by disease or injury as to be beyond repair, the patient should be destroyed. All diseases carry with them a greater or lesser degree of pain, varying from that of a slight physical inconvenience to an excruciating agony. Pain has been proved to be more superficial than deep-seated, as it was originally believed; thus, in an animal suffering from enteritis, the major degree of pain emanates from the superficial cutaneous sensory nerves of the abdominal wall, hence the logical treatment adopted by the older practitioners of applying soothing hot water rugs to the abdomen. In like manner, in cases of pneumonia, the seat of pain is not actually in the parenchyma of the lungs, but in the chest wall. By relieving pain, the attendant is serving a twofold purpose—*i.e.*, conserving his patient's strength and overcoming distressful symptoms.

Of course, it may be argued that disease and pain are respectively cause and effect, and that by counteracting pain the cause is left largely unaffected; while this is so up to a point, it cannot be denied that pain is a wearing-out condition, and may eventually kill by sheer exhaustion. There is a variety of drugs and agents used to counteract pain, and considerable discretion is demanded on the part of the prescriber in the choice of them. Thus, when pain arises from some disturbance of the circulation, phlebotomy, with or without diffusible stimulants such as spirits of ammonia, may bring relief. When the nervous system is in a state of high tension and irritability, nerve sedatives are called for—opium, belladonna, camphor, chloral hydrate, bromide of potassium, etc.—and, of course, when more immediate results are demanded the hypodermic injection of morphia, atropine, etc.

Locally painful areas may be relieved by hot fomentations followed by anodyne lotions such as opium and lead lotion, belladonna liniment, camphor liniment, etc., and when circulatory tension exists lancing or systemic bleeding may be carried out. Finally, counter-irritants form a large group of agents which serve the purpose of counteracting pain—*i.e.*, strong stimulating liniments, blisters, actual cautery, setons—while in certain local conditions neurectomy completely overcomes pain.

PARACENTESIS.

Abdominal.—As a result of the accumulation of a large quantity of fluid, it may be necessary to tap the peritoneal cavity. The best attitude for operating is the standing one, the site chosen usually being a little behind the umbilicus, strict aseptic precautions being observed. The hair having been clipped at the seat of operation, the skin is painted with tincture of iodine, and a sterile trocar and canula passed through the abdominal wall at right angles and the trocar removed, the fluid being allowed to drain away. Some authorities suggest a gradual removal of the fluid owing to the danger of collapse, but, given a sound heart, this precaution is quite unnecessary. It is, however, advisable for the operator's safety to have a twitch applied, and a fore leg picked up in the case of the horse, a pair of bulldogs inserted in the nose, and a "span" applied to the hind legs in the cow, while in the dog a muzzle should be used. After removal of the fluid the canula is withdrawn and the skin puncture repainted with iodine. It may be necessary to re-tap several times, in which case a different site should be chosen each time. When it is considered advisable, medicated dressings after removal of the fluid may be injected through the canula into the abdomen, but on no account should any solution of iodine be used, for this drug appears to possess the power of setting up plastic adhesions on the peritoneal surfaces.

Pericardial.—As the result of an accumulation of serum or pus in the pericardium, pressure upon the heart may be so great as to demand the immediate removal of the fluid. This is effected by means of a special aspirator or, more simply, by a small trocar and canula. The seat of operation is usually between the fifth and sixth or seventh ribs, and 1 to 3 inches above the edge of the sternum on the left side, according to the subject operated on. The hair is clipped or shaved and the skin painted with tincture of iodine, and the sterile instrument carefully passed into the chest in a slightly upward direction close to the anterior border of the rib to prevent injury to the intercostal vessels which run down the groove situated on the posterior border of each rib. As soon as the instrument reaches the pericardial sac—a fact which the operator can only determine by intuition gained from experience—the trocar is withdrawn and the fluid allowed to steadily drain away. The standing position is the best for operating, and similar means of restraint should be adopted as in abdominal puncture. It may be necessary to re tap at intervals according to the demand of circumstances.

Thoracic.—The site chosen is between the fifth and seventh ribs, a little above the thoracic vein, and here also the hair is clipped or shaved, and the skin and trocar and canula sterilized. The instrument is passed through the chest wall almost at right angles, and as soon as it enters the chest the trocar is withdrawn. In these cases of plastic pleurisy the mediastinal foramina become blocked with lymph, so that it is necessary to tap both sides of the chest to remove all the fluid. When the flow ceases from the canula owing to coagula the trocar should be reinserted, and this repeated if necessary.

PARALYSIS OF NERVES.

Auditory Nerves.—The cause should be searched for and, when possible, removed. If due to inflammation of the aural canal, treatment for otitis is indicated. If from brain lesions, the case is not very hopeful, and unless the animal is valuable it should be destroyed. If the condition is congenital, treatment is of no avail.

Facial Nerves.—Paralysis here is most commonly seen in the horse. It may be unilateral or bilateral. The affected muscles should be massaged two or three times a day, or a blister may be applied, or the application of electricity may be tried. If there is a wound present this should be antiseptically attended to, and in like manner abscesses and new growths should not be overlooked. The patient should have a purgative at the outset, and such agents as strychnine, veratrine, and caffeine may be given a trial.

The diet should be light and sloppy, owing to masticatory limitations.

Femoral Nerve.—Paralysis of this nerve is not commonly seen in practice, and is invariably due to an injury causing stretching. If the case is recent and atrophic changes have not made themselves manifest, an aloes and calomel ball should be given and the quarter well massaged with stimulating ammonia liniment. After the first two or three days the animal should be compelled to move about as much as possible. Later, if progress is slow, a strong vesicant should be applied all over the quarter, and if this fails two or three setons may be inserted. Lastly, galvanism may be tried and a long rest ordered.

Hypoglossal Nerves.—Paralysis of the tongue may arise from disease or injuries affecting the particular nerve centres in the brain, in which case it is accompanied with cerebral symptoms, or it may be due to local injuries to the tongue itself. The paralysis may be unilateral or bilateral. In the former case the tongue hangs from the mouth and is drawn to one side, in the latter it is pendulous and soon becomes œdematous. The animal being unable to feed, sloppy gruels should be allowed, and, if necessary, artificial feeding by means of the stomach tube and nutrient enemas.

If the tongue is swollen, it should be scarified and fomented with saline solution; further, owing to the mouth being liable to become septic, it should be irrigated two or three times a day with a mild antiseptic. Lastly, the tongue may be placed in a muslin pouch and retained inside the mouth by means of straps tied over the poll. Beyond these palliative measures, which are largely expectant, little else can be done, and after the lapse of a reasonable time, if no improvement is noted, the animal should be destroyed.

Obturator Nerves.—In those cases where the condition is due to the throwing out of exostoses at a point along the nerve course, treatment is of no avail. If due to stretching, treatment as carried out in femoral paralysis is worthy of a trial.

Optic Nerves.—Paralysis of the optic nerves is associated with acute disease of the brain, such as encephalitis, meningitis, concussion, or chronic phases due to neoplasms; consequently, treatment of the conditions as they exist should be carried out.

Pharyngeal Nerves.—When the origin is in the brain, treatment is usually hopeless. If it is local, the subcutaneous injection of strychnine or the application of galvanism may be tried, while a strong blister applied to the pharyngeal region is often beneficial. When the paralysis is complete, artificial feeding must be resorted to either with the stomach pump or *per rectum* with the enema syringe.

Pudendal Nerve (*see also* **Paraphymosis**).—Paralysis of the penis is usually brought about by an injury, but it is occasionally seen as a sequel to such debilitating diseases as influenza. As a result of the paralysis, the penis hangs pendulous from the sheath, its circulation becomes interfered with, and œdema follows; this must be guarded against at all cost by supporting it close against the abdominal wall by means of an abdominal bandage. The penis should be massaged daily and a course of nerve tonics tried. If this treatment fails, amputation is advised.

Radial Nerve.—Galvanism, massage, and repeated blisters are the practitioner's sheet anchors here, combined with prolonged rest. Some cases respond to treatment readily, others do not, and often have to be destroyed.

PARAPHYMOSIS.

In these cases of paralysis of the penis the practitioner is seldom consulted until one or several days have elapsed, consequently he usually finds the penis hanging as a pendulous, lifeless, œdematous organ, the sheath being usually swollen in addition. Deep scarification of the penis and sheath combined with prolonged fomentation, and followed by massage and kneading of the organ, will reduce it considerably in size, so that it may be returned to the sheath and retained *in situ* by passing two or three sutures through the sheath orifice and applying an abdominal bandage. In addition, the patient should be placed on a rich diet, a course of tonics ordered, and subcutaneous injections of strychnine. If this treatment fails, amputation is called for.

PARAPLEGIA.

This term is usually applied to those paralytic conditions affecting the hind quarters, the origin being in the spinal cord. Where organic disease of the spine exists, such as is seen in the case of neoplasms, effused blood subsequently organized, injuries to the spinal vertebræ, treatment can be of no avail, and the animal should be destroyed. When the derangement, however, is of a more functional nature, much good may follow suitable treatment; but before this is attempted every effort should be made by noting the clinical data, and linking them up with the history of the case, to ascertain whether central or reflex forces, or both, are at work. In paraplegia of the larger animals, bedsores must be guarded against at all costs from the outset by placing the animal on a soft bed, such as a foot or two of moss litter, sand, or sawdust, on the top of which is short-cut straw; by repeated turning from one side to the other; and by the use of knee and hock caps. If the animal makes no sign of rising in a few days, slinging may be considered advisable provided the patient takes kindly to it. Cattle, however, do not make such good subjects for slinging as horses, largely on account of being ruminants. In beginning medicinal treatment it is always good policy to give a brisk purgative, which should be followed up by a course of nux vomica and potassium nitrate or potassium iodide. Enemas and catheterization may also be called for. Stimulating liniment or even blisters should be applied to the loins, and in some cases much good follows ironing the back with a hot laundry iron. In other cases the application of a fresh sheep-skin followed by a mustard plaster does good. In the writer's experience, if an animal is unable to support itself after seven to ten days' treatment, the case may be looked upon as hopeless. In the dog, the pig, and the sheep the same principle of treatment is advised.

Provided acute myelitis does not exist, the intramuscular injection of strychnine is advised, and in those cases where spinal effusion is suspected lumbar puncture is indicated, to remove superfluous fluid followed by injection into the neural canal of one-quarter the usual subcutaneous dose of strychnine dissolved in sterile solution. The writer observed a severe epidemic of paraplegia in cattle and horses during the winter of 1917-18. A short bacillus was isolated in every case from the blood-stream and spinal fluids. Many lumbar punctures were made, and in every instance fluid escaped under pressure (see Lumbar Puncture). Vaccines were made from the isolated bacillus, and these appeared to exercise considerable curative and prophylactic properties, particularly in the case of the former if taken in hand in the early stages.

PARASITIC DISEASES.

Although, in the strictest sense, any disease due to a living micro-organism is a parasitic one, only those due to certain protozoa, arthropods, and helminths are considered under this heading. Even when so limited, the subject is so vast that only the actual treatment and prevention of those conditions of general importance have been dealt with. Nursing and general considerations must follow the usual thorough lines. In a great number of parasitic conditions treatment is still empirical, but in some, at least—thanks to the works of Nuttall and others in this country, and Hall and his colleagues in America—more exact methods have been placed in our hands. In many instances remedial measures which have to be applied to large numbers assume quite a different aspect from when one valuable or well-cared-for animal is under treatment. The remarks which follow are limited, otherwise there would be hardly any end to alternative treatments. Two points stand out, particularly with regard to diseases due to entozoa—viz., (1) in a great number of cases, by the time symptoms are shown, irreparable local and general damage has been done; and (2) the prevention of reinfection during treatment is of primary importance. So long as parasite-bearing hosts can infect food, so long will parasites cause serious loss to herded animals. Another point of general interest is the fact that a number of adult hosts may harbour a few parasites of a given species without showing any symptoms, yet their progeny may soon become seriously infested; this is very much in evidence in the case of coccidiosis in rabbits and stomach worms in ruminants. Such carriers no doubt explain the origin of many obscure outbreaks.

In discussing treatment under the different parasitic diseases, no mention is made as to the advisability or not of adopting therapeutic measures. This is, however, a matter of great importance, and each case or outbreak must be judged upon its own merits. Often, upon economic grounds, badly infested animals may have to be slaughtered immediately if there is a chance of realizing upon them. As a matter of convenience, segregation into three groups, each requiring different measures, will often be found convenient when dealing with flocks or herds—viz., (1) badly affected; (2) slightly affected; and (3) apparently healthy, but exposed to infestation.

PROTOZOA.

Babesioses (Piroplasmoses).

In the United Kingdom the piroplasmoses are not nearly so important as in tropical and subtropical countries. They are apparently all tick transmitted, and their control is intimately bound up with the destruction of, or rendering free from infection, the various species of ticks which are known to transmit each parasite.

British Redwater is due to *Babesia bovis* and *B. divergens*, and is transmitted by *Ixodes ricinus* and *Hæmaphysalis punctata.*

Treatment.—Affected animals should be housed, and as many ticks as possible removed by hand-picking from the predilection seats under the belly, dewlap, udder, axilla, inside of the thighs, and around the anal fossæ. In many cases this can be assisted by sponging with one of the many dips, disinfectants, or skin dressings in common use (see Ticks, p. 404). The diet should be liberal and nutritious, such as bran or linseed mashes, and oatmeal or maizemeal gruels; if the animal ruminates well, green grass can be offered, but hay is contra-indicated on account of its constipating tendency. A liberal supply of water is necessary. A laxative in the form of ½ to 1 pound of salt in linseed tea, or a few pounds of treacle, is first given for general reasons. Quite a number of cattle return to apparent health after this. Further treatment is directed against the resulting anæmia and stasis of the alimentary canal. A typical prescription with this end in view contains sodii bicarb., ferri carb., pot. chlor., p. nuc. vom., and p. gentian. rad., and is given three times a day for a couple of days. Artificial Carlsbad salts is sometimes given as the evacuant, followed three times a day for a couple of days by a combination of sp. æth. nit. and tinct. nuc. vom. in water.

With regard to actual treatment aiming at the destruction of the parasites in the blood, Craig ("A System of Veterinary Medicine," edited by E. Wallis Hoare, 1915, vol. i., p. 1010) says that a fair degree of success was obtained by the intravenous injection, as recommended by Nuttall, into the jugular of 100 to 200 c.c. of a 1 per cent. sterile solution of trypan blue, but that a laxative was also necessary. A second dose is apparently of no service when the first one has not brought about the desired result. Fraser (*Veterinary Record*, 1921, p. 941) reported on seventy-three cases treated by the intravenous injection of 15 grains of tartar emetic in 2 ounces of sterile water as follows: Number of cases treated, 73; cured with one injection, 46; cured with two injections, 16; cured with three injections, 3; cured (delayed), 7; died, 2; total of injections, 88. The injection is carried out in the usual way, but blood must run through the needle both before and after the injection of the fluid to ensure that no solution gets into the subcutaneous tissue to cause abscess formation.

Prophylaxis.—Animals grazing with an affected beast may contract the disease; the ticks should be removed from them and, if deemed necessary, one of the intravenous injections can be given.

Prevention.—In this country tick land should be avoided and have grazed upon it non-susceptible animals, such as sheep and horses, for about fifteen months, until the ticks have become clean. Sheep will take up the ticks, and if then dipped in suitable tick-destroying dips the parasites become very much lessened. Suitable lands can be drained, tilled, or even have the rough growth which they often contain burnt.

As the blood of cattle which have passed through an attack contains the parasite, the hosts are subject to fresh attacks after undergoing severe hardships, such as at parturition, and in these cases the intervention of the tick is not necessary. Cases of this nature are often extremely serious. When a pasture still harbours ticks, which have become clean by feeding on sheep or other hosts, care must be taken not to reintroduce an animal whose blood is infected. The constant dipping of cattle with arsenical preparations, as is necessary abroad, would hardly be economical or practical in this country, although it is an effective barrier against the tick.

Inoculation Methods.—Young stock reared on redwater land appear to have a high degree of resistance to clinical manifestations of the disease as a result of repeated inoculations by ticks during early life. Clean animals about to be brought on to such farms can be immunized by the injection of 10 to 20 c.c. of defibrinated or citrated blood of recovered animals or those reared on the farm. It is given intravenously or subcutaneously. The resulting reaction is said not to be serious, and after a fortnight's isolation under cover, the animals can be brought into contact with others.

East Coast Fever (**Rhodesian Redwater**) is due to *Theileria mutans*, and is transmitted by several species of *Rhipicephalus*. There is no satisfactory drug treatment for it, but the mortality has been greatly reduced upon tick-infested grazing by dipping every third day according to the method of Watkins Pitchford (see Ticks, p. 405).

Equine Malaria, or Biliary Fever, is due to *Nuttallia equi;* up to the present there is no exact drug treatment. Tempting food, good hygiene, calomel and aloes to open the bowels, and salicylates with mercury salts are the chief means of helping to keep the animal as fit as possible in order to overcome the infection.

Ovine Piroplasmosis (**Carceag**), due to *Babesia ovis* and transmitted *Rhipicephalus bursa*, occurs in Central Europe and certain American States. One writer has affirmed its existence in Wales, but there is up to the present no confirmation of this.

Malignant Jaundice of the Dog (**Biliary Fever**) occurs chiefly in India and Africa. It has also been recorded in Italy and France. Up to the present it has not been found naturally in England. It is due to *Babesia canis*, and is transmitted by several species of tick. Before Nuttall and Hadwen's experiments were published, the disease was a very fatal one indeed, but now, with proper attention to nursing, attacking the disease at its onset, and the use of trypan blue, a very high percentage of recoveries can be obtained. Montgomery ("A System of Veterinary Medicine," edited by E. Wallis Hoare, 1915, vol. i., p. 1033) states that, out of 300 cases treated, over 95 per cent. were cured. Nuttall and Hadwen originally used 0·2 to 0·65 c.c. of a saturated solution of trypan blue per pound of the dog's body weight. It was given subcutaneously. Great care must be taken to prevent abscess formation at the site of inoculation. Montgomery recommends a 2 per cent. solution, the dose of which is 5 c.c. for a dog of 20 pounds, and so on in proportion. One dose is nearly always sufficient, but relapses may occur about the tenth day; a second injection may then be given, but often ordinary treatment of symptoms is sufficient.

Coccidioses.

This important group of diseases, as will be seen from the following table, occurs in many of our domesticated mammals and birds. They are frequently referred to as psorospermoses.

Name of Disease.	*Host.*	*Parasite.*	*Chief Lesions.*
Intestinal coccidiosis, intestinal psorospermosis, bloody flux or scour, red dysentery, hæmorrhagic enteritis	Ox, 6 months to 2 years	*Eimeria zurni*	Large intestine
Scour..	Sheep, lambs	*E. faurei*	Small intestine
Scour..	Goats, kids	*E. arloingi*	Small intestine
Pot belly, pottle belly, bain, spotted liver	Young rabbits and hares	*E. stiedæ*	Intestines, liver, nasal cavities
White diarrhœa, going light, enlargement of liver, infectious entero-hepatitis, dysentery, spotted liver	Fowl, poultry, game, and other birds	*E. tenellum*	Intestines, liver

Coccidiosis of Cattle usually appears in a scattered manner, affecting a few animals at a time in warm seasons, often on wet and poor pastures. Animals from about six months to two years of age are most often affected.

Treatment.—Affected animals should be isolated by being housed, given a good bed, and, if possible, a warm rug. Food should be of a demulcent nature, such as milk, gruels, eggs, and linseed tea. Treatment along rational lines—viz., the administration of intestinal styptics, astringents, and antiseptics—is, unfortunately, not of much avail. However, the empirical method of giving 2 to 4 drams of ipecacuanha wine in a pint of strong stewed cold tea three times a day for a week usually brings about improvement after three or four doses. Very young animals and those which lose flesh rapidly do not progress so well. If the straining is very marked, a course of a few small doses of chlorodyne may be indicated. Some writers speak favourably of various antiseptics, and success is claimed for tannoform and tannalbin. Enemata of a warm solution of 1 in 1,000 of potassium permanganate are sometimes used.

Prophylaxis should have for its aim the destruction of all the voided manure on the pasture, and the crib feeding of in contact animals until this has been done and their fæces contain no coccidia. These points are extremely difficult to achieve on the farm, and, moreover, often only one or two beasts get the disease out of a dozen or so. Possibly good and increased feeding of the in-contacts, as well as offering them a powder containing chloride of sodium, sulphate of iron, and powdered gentian, is as much as one can do under usual farm conditions.

Prevention.—The disease rarely becomes serious enough to warrant general preventive measures on the farm, yet infected animals give out oöcysts in their fæces. The examination of such fæces and the isolation of positively infected animals would be a sure way of limiting the spreading of the coccidia. The dung of these housed animals could be mixed with quicklime and placed on arable land. For purposes of disinfection against coccidia, a 3 per cent. solution of sulphuric acid is most effective. Sheep may be grazed on infected land during the months of June to September. The spread of this, as well as other parasitic diseases of the intestinal canal, will continue until fæcal examination and isolation become the rule for new purchases.

Intestinal Coccidiosis of Lambs.—In some outbreaks of this disease the mortality ranges from 10 to 30 per cent. of the lamb strength. As the oöcysts do not become infective for three days after leaving the intestine, three-day folding, dry feeding, and treatment on the lines already indicated may be tried.

Intestinal Coccidiosis of the Goat is very similar to that of lambs, but it is common to find the parasite in the fæces of goats showing no symptoms whatever. At other times it is present with various pathogenic worms. There is, however, no doubt but that under certain conditions which break down the vital defences of the host it can and does produce serious disease in young goats.

Coccidiosis of Rabbits and Hares.—Delépine stated that the fæces of 92 per cent. of rabbits, wild and tame, which he examined contained coccidia. There is no doubt that they are extremely common in apparently healthy animals, and, as above remarked, something is wanting to bring them into a state of virulence, whether this be an increase in the attacking powers of the parasite or a weakening of the defences of the host. It is extremely common in hutched youngsters at the moment of weaning.

Treatment.—As far as his experience goes, the writer does not think there is any satisfactory treatment. A weak solution of copper sulphate on dry food is said to be of use, and an infusion of catechu, as used for birds (which see), is praised by others. In the season fanciers offer black currant and raspberry leaves. Green food should be withheld for a while. In the case of wild animals little or nothing can be done.

Prophylaxis.—Affected animals should be isolated, all the bedding destroyed, the hutch and feeding utensils disinfected with a 3 per cent. solution of sulphuric acid, and then whitewashed. Feeding should be good and liberal.

Prevention.—Keen fanciers maintain that the presence of coccidiosis, with few exceptions, means neglect. Daily cleaning out or the provision of trays will allow the excreta to be removed before the oöcysts have undergone sufficient development to reinfect. Feeding should be good and liberal, especially at the time when young are weaned. This is the most likely time for infection. If green food is given it should be in small amounts, well withered, and should follow a good dry meal. With so many animals showing coccidia in their fæces, the isolation of infected animals would hardly be practicable. In the wild animal nothing short of a great reduction in the numbers upon a given estate and trying to reduce all possible sources of infection will effect any improvement.

Coccidiosis of Birds.—A great number of avian species are liable to the disease, and they are most often attacked when young—from a few days to three months old. Practically all species of domesticated game and small birds may contract it. It occurs most often in warm seasons and where there is overcrowding.

Treatment.—The Grouse Commission, in their report, stated that they obtained excellent and satisfactory results in the treatment of experimentally infected cases in many species of birds with a solution of crude catechu as drinking water. For birds the size of fowls, 10 to 14 grains to the gallon were used, those the size of a pigeon took 10 grains per gallon, and canaries 5 grains per gallon. Feeding, watering, cleanliness, isolation, and disinfection should be upon lines to prevent further infection.

Prophylaxis.—All affected birds should be isolated, and all in-contacts treated and moved to clean ground. Tainted land should be heavily limed, and, where possible, trenched deeply and then rolled.

Prevention.—The methods of spreading the disease are indeed many, and preventive measures should be directed against these. A carrier amongst young birds is a very likely means of starting the disease. It is stated that the egg may become infected before it reaches the shell gland, and, further, that the shell may harbour the parasite. In this way, unless precautions are taken, chicken may be exposed to the disease in the incubator or under the hen. Various crates, foster-mothers, and other impedimenta of poultry culture may spread the disease. Then there are the flying wild birds and ducks to infect drinking places. High, drained land should be chosen wherever possible, overcrowding must not be allowed, and all feeding, watering, and other receptacles must be kept clean and free from infection.

Sarcosporidioses.

At the moment, in none of our animals are the lesions due to the various species of *Sarcocystis* of any more than passing interest save from the meat inspection point of view.

Trypanosomiases.

The important fly-transmitted diseases due to species of *Trypanosomum* come more particularly within the domain of tropical medicine. Although some progress has been made with regard to their treatment by the employment of atoxyl and arsenious acid, a great deal of investigation will have to be done before treatment becomes of real practical value.

NEMATODA.

Recent work has discredited quite a number of drugs which were previously regarded as of great value in the treatment of nematode infections. We are indebted to Hall and his colleagues for many advances in this direction. By counting the worms passed during treatment and comparing the figures with the number of parasites found at the post-mortem examination of experimental animals, the real efficiency of agents has been obtained. Such methods are much more reliable than older views, based upon bodily improvement or the number of worms voided without any reference to those which may have been left behind.

The diagnosis of worms must be based upon finding pathogenic forms or their ova in sufficient numbers in the secretions or excretions of the affected organs, coupled with a clinical picture of parasitic invasion. A few worms known to be pathogenic may be present in unthriftiness due to other causes, and cases presenting the old clinical picture of worms may be due to many other factors.

When treatment is undertaken, it must be carried out in such a manner that not the smallest detail is missed. In fasting, it must not be forgotten that the bedding may be eaten. The doses mentioned hereunder are for the average-sized animals.

With regard to prophylaxis and prevention, there are several items which are of general application. Nematode eggs must come to the exterior in order to complete the life cycle, and by recognizing this fact one can at once put a stop to any further infection by offering uncontaminated food and water. Such remarks, of course, do not apply to certain of the nematodes transmitted by flies or other agencies, which are to us not very important. Manger and bucket diet, or feeding from the crib on a dry or bare lot are therefore important in many forms of treatment; in fact, by this means, together with warmth, good nursing, and combating the resulting anæmia and debility, many animals may be so fortified as to throw off the effects of parasites. The safe storage, proper treatment, and final disposal of manure is our one chief means of checking the prevalence of gastro-enteric helminthiasis.

Low-lying and water-logged land is often more favourable to completion of the parasitic life-cycle than drier land at higher levels.

The overstocking of land means more fæces to the acre, and with some infected animal or animals in the herd or flock there must be greater chances of infection. The cutting of green crops and feeding them from the manger to animals in the yard is a valuable means of checking the spread of intestinal parasites. It is possibly the closest that animal management will ever get to water-carriage system, which has done so much to reduce intestinal parasitic diseases of man in modern communities. In grazing, grass is damaged and wasted, and already, in some countries at least, soiling is being praised as a practical proposition from an agricultural point of view alone. Improved conditions of farm management with regard to land no doubt lessen the prevalence of parasitic diseases. Drainage and the rotation of crops are of material value. Wherever possible, the grazing of animals not liable to be infected by worms which have been causing loss will, if continued throughout the year from frosty times to the reappearance of severe weather, prevent further losses. The application of top dressings to the land is spoken of highly by some authorities, but at the best it must miss large areas per acre. A damp period with a temperature above 50° F. in the spring would appear a most suitable time to use such a dressing. Agents which are also of agricultural value are most often used, such as salt, quicklime, and iron sulphate, about 4 cwts. to the acre. Quicklime, however, readily turns into the carbonate, and when mixed with manure considerably lessens its value.

Ankylostomiasis (Uncinariasis, Dochmiasis).

Ankylostomes give rise to a condition in dogs and cats somewhat similar to that seen in man. Although *Ankylostoma caninum* occurs here, it is usually in numbers too small to produce disease. In packs of hounds it may cause bleeding from the nose. In America and some other countries it is responsible for serious loss.

Treatment.—Hall, in his experimental work, found that a high degree of efficacy against ankylostomes could be obtained with oil of chenopodium. He gave three doses of 10 minims at hour intervals to large and average-sized dogs, and 5 minims to smaller ones. For very small animals the latter dose is much too high. It is best to give it with 15 c.c. of castor oil in soluble elastic capsules. A purgative in the form of castor oil should be offered an hour after the last dose. Chloroform added to the final dose aids removal of the worms. Dietetics and nursing are extremely important in this debilitating condition. The resulting anæmia is sometimes very stubborn.

Continental authorities recommend for hounds three doses at intervals of two hours of 30 grains of thymol in capsule after a night's fast. In about six hours a saline purgative is given. The treatment can be repeated at an interval of eight days.

Prophylaxis.—In large kennels, those of a damp nature favour the completion of the life history of the parasite. The isolation of the affected, with scrupulous individual and general cleanliness, is essential, for infection takes place not only by way of the mouth, but also through the skin.

Prevention.—Periodic scalding out of kennels with hot water, up-to-date hygiene, and microscopic examination of the fæces, with energetic action when positive, are the chief means of warding off ankylostomiasis.

Ascariasis.

Horse.—The large white worm, *Ascaris equorum* (*A. megalocephala*), is very common in the horse's small bowel, more especially in housed animals.

Treatment.—After reducing bulky food for a few meals, the midday feed should be a small bran mash. From then until the next morning nothing should be offered. One dose of carbon bisulphide (6 drams) should be administered in a capsule. It is unnecessary to remind readers of the inflammable and objectionable nature of this drug. The exhibition of a purgative is not necessary after drenching, and worms may be passed during the next week. Hall and his co-workers found this drug to have a very high degree of efficiency. Tartar emetic in 3-dram doses gives results inferior to the above. It is given in a bucket of water in the morning, a small bran mash without drinking water having been offered the night before. After the drug has all been taken, food is given in half an hour, and a purgative in the form of oil is then administered. Grimme, quoted by Railliet (Int. Vet. Congress Reports, 1915, p. 737), recommends 77 grains of this drug for animals six months old, twice the amount for yearlings, and from 4 to 5 drams for those over two years old.

Prophylaxis demands that an examination of the other animal fæces should be undertaken, and, if necessary, these should be treated. Careful storage of the manure, so that none can blow on to the food or gain access to the water trough, prevents the completion of the life cycle. A covered water trough may be necessary in certain cases.

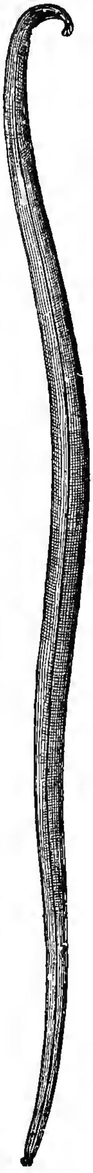

FIG. 100.—ASCARIS LUMBRICOIDES: MALE, LATERAL VIEW. (Railliet.) (Natural size.)

Prevention is essentially similar to the above, especial attention being paid to new arrivals.

Pig.—The large white worm of the pig is regarded by many as being identical with that of man (*Ascaris lumbricoides*). It is worthy of serious consideration in many parts of the country, where it is especially common in the small intestine of youngsters some time after weaning.

Treatment.—Oleum chenopodii has been proved to be of great value by Hall. The dose is 1 mil (=1 c.c.=16·9 mm.) for every 25 pounds body weight. The maximum dose should not exceed 8 mils. It is given in capsules after a complete fast of twenty-four hours, and is followed immediately by castor oil, 1 ounce for every 100 pounds of body weight. Food is withheld for a few hours after medication. In America, where hog-raising is so extensive, capsules containing santonin, calomel, oil of chenopodium, oil of wormwood, and naphthol are in common use. Railliet (*loc. cit.*) recommends 75 grains to 5 drams of powdered areca nut, according to the pig's age. It is given in an electuary of flour and honey, and followed in some hours by a purgative such as calomel or castor oil.

Prophylaxis should follow general lines, especial attention being paid to cleaning up sties and runs. Wallows and the water, if in ponds, are likely to become contaminated. Affected animals are to be isolated and treated. Whilst individual dosing is irksome, it is best to adopt it in this country.

Prevention is chiefly directed against the introduction of infected pigs into a clean herd.

Dog.—Ascariasis of the dog is an important condition, especially in puppies, and is due to *Toxascaris limbata* and *Belascaris marginata* in the stomach or small bowel.

Treatment.—Hall's doses for oil of chenopodium, which is very efficient against these worms, are as follows:

Toys	2 to 3 minims.
Dogs weighing 10 pounds or less	5 minims.
" " 10 to 20 pounds	10 "
" " 20 to 30 "	15 "
" " over 30 "	20 "

It is given after fasting, usually in a soft capsule, and followed immediately by an ounce of castor oil, except in the case of toys, which receive ½ ounce. If the drug is given in castor oil there is less risk of toxic symptoms, but a large amount of saliva is shed. Oil of chenopodium should not be administered in cases of kidney disease, heart affections, febrile diseases, or marked gastro-enteritis. French writers use areca nut in butter pills or capsules (dose, 75 grains to 2½ drams) after fasting, and followed in two hours by a dose of castor oil.

Santonin in pill form is given in doses of ⅛ grain per pound body weight, with a maximum dose of 4 grains. It should not be used for puppies under two months old. With these it is safer to postpone real treatment for a while. A stock mixture for puppies may be made of the following:

Oleum Chenopodii Oleum Anisi Spiritus Æther Nitras	āā ℥ss.
Oleum Terebinthinæ	ʒss.
Oleum Olivæ Oleum Ricini	āā ℥v.ss.

Those under eight weeks old take 1 dram of this mixture in milk after a fast, those under six weeks ½ dram, and toy pups about a quarter of these doses. Guessing the weights and ages when dealing with worms in dogs is inexact and may lead to disaster.

Prophylaxis.—The early appearance of ascarids in puppies appears to be due to infection from the soiled teats and hind quarters of the dam. Although one hesitates to proclaim universal worming, steps should be taken to free brood bitches before pregnancy is far advanced. Washing of the hind quarters and mammary gland at parturition are important. General measures as indicated previously under this heading are also necessary.

Prevention.—Sanitation must be upon modern lines, with no chances of contamination of the food and water. New arrivals and the visits of dogs to and from other kennels must be properly controlled.

Cat.—Cats are liable to invasion by *Belascaris mystax.* Whilst the general aspect of ascariasis in them is the same as in dogs, they are very susceptible to oil of chenopodium, and Hall recommends giving

½ ounce of castor oil and then dropping 2 to 4 minims of the above oil on the tongue according to the size of the animal. This he states is safe and effective. The writer's experience with this treatment is the same, but it is preferable to start with the minimum dose.

Equine Strongylidiosis.

Although equines are rarely attacked by the minute worms such as *Trichostrongylus axei*, the most important parasites are those which were previously described as sclerostomes. It is only within the last twenty years that any serious progress has been made in equine helminthology, and that commenced with the publication of Looss' monograph. There are now known several genera of round-worms which inhabit the horse's colon and cæcum, the total number of species reaching somewhere about seventy. *Strongylus* contains the largest species. *S. equinus* is not so common as *S. edentatus*, which may sometimes be found under the parietal pleura and peritoneum and in the cryptorchid's testicle. *S. vulgaris* in its immature form causes verminous aneurisms of the anterior mesenteric artery. *Triodontophorus sp.* are somewhat smaller. Six species have been described, and most of them occur here. *Œsophagodontus robustus* is the only species of the genus. Of *Gyalocephalus* there are two species—viz., *G. capitatus* and *G. equi.* The genus containing the most species is *Cylicostomum*, of which there are about thirty, including the varieties. They are now often referred to as the *tetracanthus* group or as red worms. With other genera they are found as immature forms in submucous cysts throughout the large bowel. The lesion varies in size from smaller than a pin's head up to a pea, and can be well seen when a portion of the gut is held up to the light. When *S. vulgaris* is present in the anterior mesenteric artery and its branches there may be great thickening of bowel wall. Other less important genera are *Cylindropharynx* and *Poteriostomum.* Infestation by worms of this group is extremely common; they are so widespread throughout these islands that few animals escape infection at some time or other. The injurious effects may be seen in early life, and be continued almost throughout a horse's period of usefulness. Bacterial invasion often follows the bowel lesion, and even when the parasites have disappeared damage of an almost permanent nature may remain to give rise to many forms of intestinal derangement, with their consequent interference with general metabolism. The lesions which follow infestation of the anterior mesenteric artery are all serious, and may cause early death by rupture of the aneurism or remain for years to give rise to thrombo-embolic colic at any moment. With a full realization of the effects of these parasites upon young stock, the possibilities of vascular phenomena and thickened bowels in later years, it is hardly too much to say that this group of worms is as important in horses as tuberculosis is in cattle.

Treatment.—Many agents and methods of treatment have been used to remove these worms, with varying results. Hall, Wilson, and Wigdor, however, working in America, obtained an efficiency of 96 to 100 per cent. with oil of chenopodium against *Cylicostomum* and *Strongylus* when given in doses of 16 mils (1 mil=16·9 mm.), and followed immediately or in two hours by a quart of linseed oil in horses that had been fasted over twenty-four hours. The horses were given a light feed in the evening, and all hay and bedding removed. No food was given next day, and the treatment was started early in the morning on the following day, food being offered three hours afterwards. Unfortunately, if the dose was lowered to 8 or 10 mils, the efficacy remained below 1 per cent. Up to the present we have no reliable data as to the dosage in this country according to age and body weight, and, further, there are no very exact means of estimating the resistance in badly-infested animals. Excellent results have been obtained here in many cases, but the toxicity of the drug has caused some to give it up. It would appear that a fast of thirty-six hours is even better, and may allow slightly lower doses. After full fasting, 2 ounces of turpentine in a quart of linseed oil has been proved to have removed 48 per cent. of *Strongylus*. The writer has several times made post-mortem examinations on horses which have been repeatedly dosed with turpentine, and found very few worms present. In such cases death has been due to submucous bowel lesions, against which we can hardly expect to do much, other than attack the parasites after gaining the lumen. When symptoms of anæmia, debility, and diarrhœa set in, one resorts to good feeding, nursing, with warmth, and gives tonics and hæmatinics. A manger and bucket diet with good hygiene should prevent further infection. The treatment of the vascular phenomena is rather hopeless, and that of colic, and displacements which may result therefrom, is dealt with elsewhere.

The combined efforts of the use of the stomach tube after long fasts and rectal irrigation with a long tube, as advocated by Smith, seem to open up great possibilities in the treatment of worms of the double colon, because large amounts of water given by the former means appear to enter the large bowel very rapidly.

Prophylaxis.—The isolation of the affected and treatment of apparently healthy, but infested, animals on a bare lot is the first essential. The same general principles as have been previously mentioned with regard to manure, pasture, food, and water must be followed. Close observation, early housing and treatment of any animals not doing well is wise.

Prevention.—The worms now under consideration are so prevalent that nothing short of an enlightened national campaign is likely to be of much benefit. The interchange of animals, especially brood mares, is a frequent means of spreading the parasites. An outbreak once investigated occurred on high Welsh hills. The native ponies contained numerous worms without showing any derangement in health. The mares were mated with a thoroughbred pony, and in the autumn of the year of their birth nearly all the foals became emaciated and anæmic, and a great number died as a result of heavy infestations, whilst their dams remained unchanged. Preventive measures, to be thorough enough to protect animals, would be harassing and crippling to horse breeding, yet one sees high-priced shire colts badly affected and hears of pedigree breeding having to be abandoned on account of "red worms." It is well known that town horses gradually become free from sclerostomes, and that summer runs at grass often reinfect them.

Habronemiasis.

Three species of *Habronema*—viz., *H. megastoma*, *H. microstoma*, and *H. muscæ*—occur in the stomach of the horse, and although important in many other countries, they do not appear to have been found here. *H. megastoma* causes the formation of submucous abscesses, and the other two species occur upon the mucous membrane. Granulomata of the sheath, summer sores, and conjunctivitis due to the immature forms of *Habronema* are encountered in some countries.

Hodgkins (*Veterinary Journal*, 1921, p. 300), by filling the stomach with hot water by means of the stomach tube, then siphoning it off and refilling until the mucin came away, obtained myriads of *H. microstoma* and *H. muscæ*. In a previous note he recorded failure with carbon disulphide, oil of chenopodium, and injections of atoxyl.

As the life cycle of *H. muscæ* is completed through the house-fly (*Musca domestica*), it is likely that the control of the other species also depends upon the destruction of such intermediate hosts, or preventing them from coming into contact with fæces, and finally gaining access to horses' drinking water and food. This, indeed, is no small problem, but anti-fly measures in stables, the covering or burning of manure, and the protection of food and water are likely to have important results.

Heterakiasis.

The commonest causes of nematode parasitic enteritis of poultry are *Ascaridia sp.* and *Heterakis sp.*

Treatment.—Hall and Foster state that against *Ascardia* 2 c.c. of turpentine, with the same amount of olive oil, followed immediately by 8 c.c. of castor oil, has an efficacy of 76 per cent.; for *Heterakis* they found chopped tobacco stems soaked in water and mixed with food had an efficacy of 19 per cent.

Hook-Worm Disease of Ruminants.

The hook-worms of cattle and sheep belong to the genus *Bunostomum* (*Monodontus*). *B. trigoncephalum* occurs particularly in sheep and goats, and *B. phlebotomum* in bovines. In the small intestine they suck blood from the mucosa and produce a condition somewhat similar to ankylostomiasis. Infection probably also takes place in a like manner. Stiles, in America, recommended for sheep, after fasting, ½ to 1 dram of thymol given at one dose. More recently 1 dram of oil of chenopodium in 5 ounces of milk has been found to remove more than two-thirds of the hook-worms present in sheep. This treatment can be repeated in about fourteen days. The general aspects of the disease are similar to other worm infestations.

Husk Hoose (Parasitic Bronchitis and Pneumonia).

Verminous bronchitis is caused by *Dictyocaulus arnfieldi* in equines, *D. viviparus* in bovines, *D. filaria* in sheep and goats, and *Metastrongylus sp.* in swine. *Synthetocaulus rufescens* gives rise to pneumonia, mostly of a nodular nature, in sheep and goats. The remaining members of the latter genus are not so important. The possibility of secondary infection by micro-organisms must not be forgotten. The disease is rare in equines, but it does occur here; in young cattle, sheep, and swine bronchitis due to worms is prevalent in autumn, and a large percentage of slaughtered sheep show evidence of verminous pneumonia. Lung lesions due to worms often co-exist with gastro-intestinal helminthiasis. This, together with the fact that a certain phase of the life cycle is passed within the alimentary canal, accounts for the improvement which is said to follow the administration *per oram* of oil of turpentine or creosote in milk or linseed oil.

Treatment.—Parasitic bronchitis in equines is so rare that one is unlikely to have to treat it. There is, however, no reason why it should not be attacked by means similar to those used in cattle. In swine, although prevalent, it is difficult to handle the animals, so that isolation of the affected, good conditions of hygiene, an increased diet, and the prevention of further infection are chiefly relied upon.

Fumigation by chlorine and other gases, although sometimes still used for calves and sheep, is extremely dangerous, and the risks of causing death to the patients and of damaging one's professional esteem are such that owners should be advised not to demand it. Grave doubts have been cast upon the efficacy of ordinary liquid intratracheal injections. Autopsies at different periods after such injections often show great numbers of active worms. Further work with coloured injections has shown that only those bronchi in the line of gravitation are coloured, so that worms in areas above the natural fall of the liquid are unattacked. Some workers claim that the antibacterial action of the agents used is of especial value. The chief active drugs used are carbolic acid, creosote, creolin, chloroform, turpentine, or essential oils such as cloves, with a sedative such as tincture of opium, and olive oil, glycerine, or water as vehicles. For calves, carbolic acid 10 minims, chloroform 1 dram, turpentine and glycerine 1 dram each can be injected every third day for three times. Olive oil 10 parts, turpentine 100 parts, and carbolic acid 2 parts in doses of 2½ drams can be used in a like manner. The usual care with regard to irritating the larynx must be observed. Where rooted objections exist to any form of operation, a small amount of resublimed iodine is dropped on a hot brick, which is placed in a bucket in the bottom of a thick sack, and the calf's head held therein until a paroxysm of coughing results.

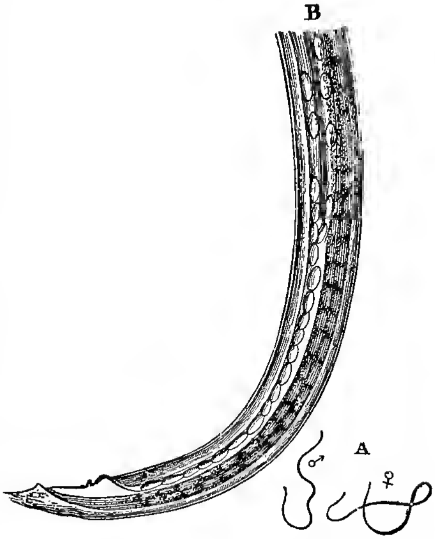

Fig. 101.—Synthetocaulus rufescens: Sheep (× 50). (Railliet.)

A, Male and female, natural size; *B*, caudal extremity of the female.

In order to overcome the objections to ordinary intratracheal injection, Scheibel introduced a spray apparatus for attachment to the canula in the trachea. A solution of creosote 1 part, 50 parts of rectified spirit, and 50 parts of water in doses of 2½ to 5 drams for calves is slowly vaporized into the trachea, coughing being avoided. In addition to medicinal treatment, affected animals should be housed. Both the coughed-up material and fæces contain larvæ, so that great care with contaminated food and the fæces are necessary to prevent reinfection.

Constant removal of food from manger and rack is necessary. A good liberal diet considerably helps treatment.

When large numbers of sheep are attacked, treatment by way of the trachea is laborious. Moussu, however, recommends for it iodine 1 part, potassium iodide 5 parts, water 50 parts, oil of turpentine 50 parts, and olive oil 50 parts. An injection of 1½ to 2½ drams on two consecutive days is said to greatly relieve symptoms. The same treatment may be applied in nodular pneumonia, but in all species pneumonia following parasitic bronchitis is a contra-indication for injection. It is such cases which so readily succumb after treatment.

In America, Herms and Freeborn found that the administration of chloroform by way of the nose was a most valuable method of treatment. It is dropped down one nostril and then the other, and the nostrils are held until the animal appears to be groggy from anæsthesia. For sheep and goats 25 to 50 minims, and for calves 1 to 2½ drams are average doses, but they will depend upon the animal's susceptibility. A drench of one of the saline sulphates is advisable after dosing. Up to three treatments at intervals of three to five days may be given. Large numbers of worms are usually expelled by coughing a few hours after the administration of the chloroform.

Prophylaxis.—The same general lines as those previously stated must be taken to prevent the spread of the disease, with additional measures against contamination of food and water from the nose and mouth.

Prevention.—In pedigree calves the disease is most usually prevented by keeping them under cover during the whole year in which they were born. With ordinary stock, calves born after March are best kept up until the following year, when frosts will have attacked the resistant forms of the worms and the animals will have become more resistant to infection. With sheep, avoidance of infested pastures and special precautions with regard to grazing and watering of lambs are the chief sanitary measures.

Œsophagostomiasis.

Cattle, sheep, goats, and swine in this country may harbour œsophagostomes in the large bowel. They are now known by the generic name of *Proteracrum*. The lesions consist of submucous cysts in different parts of the intestines, and even in the mesenteric lymphatic glands. *P. radiatum* of cattle, *P. columbianum* of sheep, *P. venulosum* of sheep and goats, and *P. dentatum* of swine are the most important species. The disease is known to butchers as pimply or knotty gut, and also as nodular disease of the intestines.

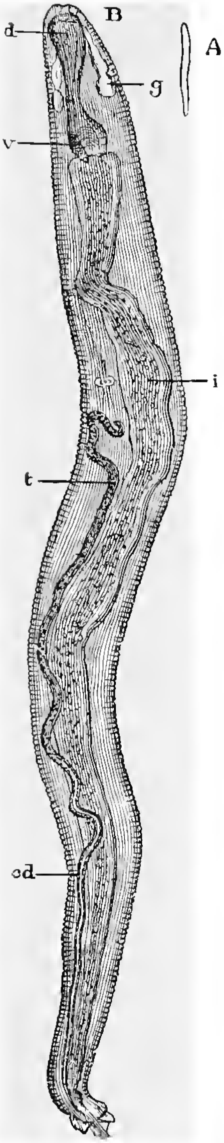

FIG. 102. — OXYURIS EQUI: MALE. (Railliet.)

A, Natural size; *B*, magnified; *d*, anterior bulb; *v*, posterior bulb; *g*, so-called salivary gland; *i*, intestine; *t*, testicle; *cd*, deferent canal.

Treatment.—The chief lesions result from the larval worms in the submucous cysts, and in this situation they are out of contact with drugs in the lumen of the bowel. For adult sheep Brumpt advised giving sodium sulphate in drinking water to bring about a liquid state of the bowel contents, and then, by means of a tube, carrying out lavage of the hind gut with an emulsion of thymol. This appears to be a laborious process, and the best that one can hope for is to prevent reinfection by manger feeding upon a bare lot.

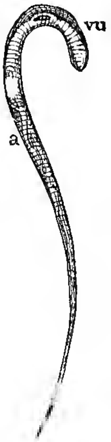

FIG. 103.—OXYURIS EQUI: FEMALE. (Natural size.) (Neumann's "Parasites.")

Oxyuriosis.

The only animal in which this condition is of importance is the horse; here *Oxyuris equi* causes rubbing of the tail, and the yellow deposit of ova around the anus is very unsightly.

Treatment.—Many writers favour rectal irrigation with soapy or vinegar water for the removal of this species. It no doubt reaches some of the parasites, but there are many in the cæcum and commencement of the colon which are undisturbed; 2 to 3 dram doses of tartar emetic in a small feed of bran in the morning after a very light feed at night for six days will remove most of the worms. After preparation with a sloppy meal or two and a long fast, 2 ounces of turpentine in a draught, followed very soon afterwards by a large dose of linseed oil, has been very efficacious in the writer's hands. Oil of chenopodium may also be used in the same manner as described under Equine Strongylidiosis.

Prophylaxis and *Prevention* are very similar. Manure may contaminate the food and water supply. Rubbers or sponges used to clean out the dock form a suitable means of conveying material to the patient's nostrils and mouth. Even when a separate article is used for the mouth and anus, they often get infected when kept in the same basket or tool-bag. A dock cloth should be hung behind each horse, and boiled every now and then until the infestation ceases. Tool-bags and baskets also require attention.

Parasitic Gastro-Enteritis.

This term is applied chiefly to the infestation of the fourth stomach and small intestines of ruminants with worms. Other animals are not so likely to have both of these organs attacked at the same time. It is known by other terms indicative of the family, subfamily, or genus of worms present, such as strongylidiosis and trichostrongylosis. The infestation, however, may be a mixed one. In cattle, sheep, and goats the disease is often very serious indeed, especially in those under one year old. The numerous parasites causing the disease are not always the same in each host, and they may be different in the domestic cattle of our colonies. Some of them are microscopic. In the writer's experience the most important are the following:

Ox :	
Hæmonchus contortus	Abomasum.
Ostertagia ostertagia	,,
Cooperia oncophora	Small intestine.
Nematodirus filicollis	,, ,,
Trichostrongylus axei	Abomasum.
Sheep :	
Hæmonchus contortus	Abomasum.
Ostertagia circumcincta	,,
Cooperia oncophora	Small intestine.
Nematodirus filicollis	,, ,,
Trichostrongylus axei	Abomasum.
Goat :	
Hæmonchus contortus	Abomasum.
Nematodirus filicollis	Small intestine.
Trichostrongylus instabilis	,, ,,
Ostertagia circumcincta	Abomasum.

Ostertagia sp. penetrate the mucous membrane, and up to the present no successful treatment has been devised for them or *Trichostrongylus sp.*

Treatment.—Affected animals should be housed the day before treatment, and all food withheld for about twenty-four hours. If many have to be drenched, a suitable receptacle with stopcocks, rubber tubing, and a metal drenching piece can be so devised that the required dose can be released quickly for each animal. The dangers and difficulties of drenching must be kept in mind. A 1 per cent. solution of copper sulphate is of proved efficacy against *Hæmonchus.* The doses are:

Lambs (three months to one year)	℥ss. to ℥i.ss.
Sheep (over one year)	℥ii. to ℥iii.
Calves	℥iii. to ℥v.
Yearlings	℥vi.

No water is given on the day of treatment, and this can be repeated in a month. A 1 per cent. solution of coal-tar creosote has been used with good results by some. The doses are:

Lambs (three months to one year)	℥ii. to ℥iv.
Sheep	℥iii. to ℥v.
Calves	℥v. to ℥x.
Yearlings	℥xx.

Craig states (International Veterinary Congress Reports, 1915, p. 761) that arsenic has given good results in his hands. He prescribes for cattle 5 to 10 grains with 2 drams of sulphate of iron, and for sheep 2 grains of arsenic and 10 grains of iron sulphate, given daily for six days in oats and bran.

Thymol, first made into a paste, then suspended in water, and followed by a purgative, is recommended by Brumpt. He gives a three months' old lamb 1 dram of thymol in about 15 ounces of water, and follows it in about six hours by a saline purgative. Thymol appears most suitable for goats. Careful attention to diet, manger feeding, and the prevention of reinfection by fæcal contamination of food and water are important.

Prophylaxis.—Apart from the general points which have already been discussed, the healthy herd should be dosed about every six weeks until the frosty weather appears. The American saying—*Permanent pastures perpetuate parasites*—is the key to the situation. Iron sulphate, salt, and a little spice may be given in dry food.

Prevention.—When the disease threatens a herd or flock, colonial farmers obtain excellent results by dosing sheep with about 50 c.c. of a 1 per cent. solution of copper sulphate in water from winter to winter. Below 40° F. the eggs and larvæ are inactive, so there is little chance of infection when the winter is a frosty one. The value of good feeding has already been emphasized. It is to the young stock that attention must be most particularly paid, for adults resist infection to a greater degree.

Syngamosis (Gapes in Poultry).

Parasitic tracheitis is due to *Syngamus trachealis* in fowls and allied domestic birds, and to *S. bronchialis* in water-fowl. Young birds are most often attacked.

Treatment.—After the isolation of the affected, those showing alarming respiratory symptoms should have any worms and exudate removed from the upper reaches of the trachea. Possibly a twisted horsehair loop, with manipulation, is the best for this purpose; if a feather is employed, it must be used carefully. In valuable birds, as a last resort, the trachea has been successfully opened and sutured, and any resulting emphysema of the neck treated by needle puncture. As in cattle and sheep, fumigation with gases or tobacco smoke is a risky procedure. Poultry-keepers give in the birds' food substances with a strong odour, which are eliminated by the respiratory tract, such as onion, garlic, and asafœtida. Turpentine 1 part and olive oil 2 parts can be applied to the inside of the trachea on two or three occasions at intervals of three days if necessary. Other essential oils, such as eucalyptus and cloves, may be used.

Great success is claimed with 15 minims of a 5 per cent. solution of salicylic acid as an injection for the trachea given through the mouth.

Prophylaxis and Prevention.—Isolation and treatment of affected birds, feeding and watering from protected vessels, with 1 per cent. of salicylic acid in the drinking water, in addition to the usual sanitary precautions, are generally sufficient to control and prevent the disease.

ACANTHOCEPHALA.

The most important member of this group is the thorn-headed worm, *Gigantorhynchus hirudinaceus* (*Echinorhynchus gigas*), of the intestines of swine. It does not appear to have been found in this country, although it is not rare in America and parts of Europe. The parasites are not often very numerous, but attached, as they are, to the lining of the small bowel by the many hooklets of their rostelli, it is extremely difficult to expel them. Some writers claim success with calomel, santonin, and castor oil after suitable preparation. The life history of these worms is stated to be completed by passage through the larvæ of certain beetles—in Europe the cockchafer (*Melolontha vulgaris*), and in America the May bug (*Lachnosterna arcuata*). Pigs become infested by taking in the worm-bearing larva from the ground, and prevention must be based upon avoidance of such places that are likely to be seriously infested with the larvæ of these beetles, and limiting the spread of egg-bearing fæces.

Nematodes of the Muscular and Other Tissues and Cavities.

Trichinella spiralis, comparatively rare here, but important in public health, is not amenable to treatment in the muscles, and the same applies to *Oncocerca sp.* of the horse's tendons and ox's musculature. *Diochophyme renalis* of the kidney of the horse, ox, pig, and dog; *Stephanurus dentatus* of the perinephritic tissue of swine; *Setaria equina* of the horse's peritoneal cavity; *S. labiato-papillosa* of the same cavity in the ox; *Filaria hæmorrhagica* and *F. inermis* of the subcutaneous tissue of equines; *F. immitis* of the dog's heart cavities, are all beyond the reach of drugs. *Dracunculus medinensis* of the subcutis and *Setaria labiato-papillosa* of the horse's eye, together with the various species of *Thelazia* of the excretory ducts of the lachrymal glands, have to be treated surgically. In many cases our knowledge of the life history of these worms is so incomplete that preventive measures cannot be definitely formulated.

(In the foregoing account a large number of unimportant or little understood nematodes have not received attention. Among these may be mentioned the very prevalent and minute *Probsmayria* of the horse's colon; *Arduenna sp.* of swine, and *Trichuris sp.* (whip-worms) of ruminants, swine, and carnivores; and *Chabertia ovina*, which appears to be harmless in sheep. Wild rabbits are often found to be infested with *Graphidium strigosum* in the stomach, an *Oxyuris* and a *Trichostrongylus* in the intestine, but they are not transmissible to domestic stock.)

TREMATODA.

Horse.

From a clinical point of view the trematodes of the horse in this country are unimportant. When liver rot has been prevalent, equines have rarely suffered from *Fasciola hepatica*. *Fascioloides magna* is likewise rare in horses. In tropical countries, however, the large bowel may contain great numbers of trematodes. The chief are *Gastrodiscus ægyptiacus*, *G. secundus*, and *Pseudodiscus stanleyi*. In the blood-stream *Schistosomum indicum* may be found. We have little reliable information as to their injurious effects and life histories, or therapeutic measures for these parasites.

Ox.

Although the liver of the ox often harbours *Fasciola hepatica*, one rarely encounters clinical cases of distomatosis. On post-mortem examination, however, extensive lesions of the bile ducts may be observed, and one is often led to think that the disease should be regarded more seriously.

In America *Fascioloides magna* occurs in the lungs, and other species of *Fasciola* are found in the livers of the native ruminants of Asia and Africa. The lancet fluke (*Dicrocœlium dendriticum*) is found abroad in company with the liver fluke. I have only once encountered amphistomes in this country, yet *Paramphistomum cervi* (*Amphistomum conicum*) is frequently found in the bovine rumen in other lands. The bovine schistosome (*Schistosomum bovis*) occurs in the portal and other veins. The general aspect of trematode control in cattle is similar to that given under the next heading.

Sheep.

Distomatosis (Liver Rot, Fluke Disease).—The sheep harbours, under almost similar conditions, the same trematodes as the ox, but the chief disease produced is liver rot, fluke disease, or distomatosis, which is due to the liver fluke (*Fasciola hepatica*). On two occasions the writer has encountered the lancet fluke (*Dicrocœlium dendriticum*) in this country—once alone, and once in company with the ordinary fluke. They are, however, commonly found together abroad. The winter of 1920-21 will long be remembered as a year of great losses from distomatosis.

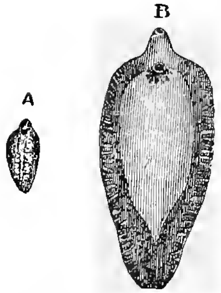

FIG. 104.—FASCIOLA HEPATICA. (Natural size.) (Railliet.) *A*, Young specimen; *B*, adult.

Treatment.—Although there are a number of drugs which have been advised in the treatment of liver rot, most of them appear to only be of value in an indirect manner. Male fern and kamala, however, seem to be of considerable value, the latter probably less than the former. Oleoresin of male fern should contain 25 per cent. of filicine and about 3½ per cent. of filicic acid. The dose varies from 45 to 75 minims, according to the age, size, and strength of the sheep. It is best given in the morning for five consecutive days, about a couple of hours before food, and in 2½ drams of an oil which does not purge.

Previously the ethereal extract was given in 80-minim doses on four occasions, but there was a great tendency to anæsthesia and tympany after its use.

The dose of kamala for a full-grown, strong sheep is about 3½ drams, but younger and less robust animals take the same amount in two doses at an interval of twelve or more hours. Weak sheep should have the same amount spread over five daily doses. After treatment the patients appear listless, may go off their food, and have diarrhœa.

More recently preparations of colloidal antimony, tartar emetic (intravenous), and emetine (intramuscular) have been praised, but up to the present the published results are not numerous enough to generalize upon. Certain of the advertised proprietary preparations have a high degree of efficacy.

In addition to actual therapeutic measures, everything possible must be done to husband the vital forces of the affected by offering an increased, nutritious and easily obtained diet, with a supply of salt, together with protection from various lowering agencies associated with the land and climate.

In-lamb ewes cannot, if badly affected, be suitable for slaughtering, and here one may attempt treatment in what would otherwise be unsatisfactory cases. In such circumstances, however, lambing is often attended with increased mortality.

Prophylaxis.—After the isolation of the clinically affected, numbers of animals will show fluke ova in their fæces. A consideration of such animals is essential; they will either be sold for slaughter or given a course of treatment, followed by a nourishing diet containing chloride of sodium, powdered gentian (4 lbs. of each), and sulphate of iron (1 lb.) in 40 lbs. of crushed grain, the amount of this mixture per sheep per meal being about ½ pint.

Prevention.—Sheep should, if possible, be purchased from clean flocks, and should be kept from wet pastures where fluke disease is known to have occurred. Water-logged areas should be drained, and when ponds and dykes are cleaned out in the summer the deposit should be subjected to anti-snail measures. Dressings of lime, salt, and iron sulphate are applied in the summer months. Salt marshes are said to be free from the fluke snail. Anti-fluke measures are indicated at the beginning of winter soon after the usual period of infestation is passed. They should comprise increased feeding, salt and iron sulphate in the food, and even drenching. Infection may take place by means of drinking water, so that a safe supply should be offered. Copper sulphate, 1 ounce in 7,800 gallons of water, is stated by the Oregon Agricultural Station to kill the fluke snail in forty-eight hours, and to be harmless to all save fish. Overcrowding means greater chances of infestation if the pastures contain encysted cercariæ. The policy of prevention will be dictated by local conditions, but the four most important factors to be borne in mind are: (1) An affected sheep (often not clinically) voiding eggs; (2) moisture for the successful hatching of the eggs and further evolution of the parasite;

(3) the presence of the intermediate host (*Limnœa*) in its watery surroundings; and (4) infested pastures with susceptible animals upon them.

The drying of dung by agricultural methods, frosts, cropping with other animals, and resting the land from grazing, will all merit consideration.

Pig.

Although *Fasciola hepatica* and *Dicrocœlium dendriticum* are sometimes met with in the livers of swine, they are not clinically important. Other exotic trematodes are *Fasciolopsis buski* and *Gastrodiscus hominis* in the intestines, and *Paragoninus westermanni* in the lungs.

Dog and Cat.

The domestic carnivora harbour several flukes—chiefly small ones—in their livers, lungs, intestines, and portal veins. Apart from the fact that many of them may also occur in man, we have little information concerning their clinical and therapeutic aspects.

CESTODA.

Cœnurosis.

Cœnuri are tapeworm cysts which have one cavity with many heads. There are only two of interest to the veterinarian:

Cœnurus.	*Hosts.*	*Habitat.*	*Adult Tapeworm.*	*Host.*	*Habitat.*
C. serialis ..	Rabbit	Muscles	*T. serialis*	Dog	Intestines
C. cerebralis ..	Sheep and goat	Brain and spinal cord	*T. cœnurus*	,,	,,

Rabbit Cœnurosis.—Rabbits affected with cœnuri are often termed " bladdery " when the cyst is found in the muscles under the skin, and when they occur in the orbit or neighbouring tissues fanciers use the term " goitre "; the cysts vary in size according to age from that of a pea up to that of a fowl's egg. They are often very prevalent in wild rabbits, and are only detected after the animals have been killed. In hutch rabbits the elevations can either be felt or diagnosed to be present by a displaced eye. Their removal is surgical. In the muscles of the loins and hind quarters a cavity remains after their evacuation. Infection takes place by means of the disintegration of segments from dogs harbouring *T. serialis*, a very common canine tapeworm. The control of the disease depends upon clearing the intestines of farm, sporting, and stray dogs of this worm.

Sheep Cœnurosis (Sturdy, Gid, Staggers, Turnsick).—Although the sheep is the usual host of this cyst, it has been found in the ox, goat, and even the horse. The usual seat is within the cranial cavity, but cases are recorded from the spinal canal. The size of the cyst varies according to its age from that of a pea to that of a hen's egg. The wall is thin, the heads project from the inner surface in groups into the fluid, and often number hundreds. The disease is much rarer than formerly, and is undoubtedly confounded clinically with other conditions, for I have received many heads from what were regarded as clinical cases of sturdy without being able to find the least trace of cœnuri.

Treatment.—The treatment of gid is surgical, and is only likely to be of any value when the symptoms indicate that the parasite is on the surface of the brain. The two common methods of removal are by trocar and canula, and by trepanation. In the former case, after the escape of fluid attempt is made to remove the cyst membrane, whilst the latter aims deliberately at its removal after the release of the fluid. The operation should be done under a local anæsthetic with the usual antiseptic care, and the median line avoided.

Prophylaxis and Prevention.—Diseased heads should be burnt, and not buried, so that they may be dug up by dogs. The brain may be destroyed through the foramen magnum, and then formalin or coal-tar disinfectant poured in. All dogs, either sporting, sheep, or strays, should be kept free from *T. cœnurus* by means of biannual treatments. One tapeworm may give rise to widespread infection over a whole range of hills. In my experience it is, however, a rare worm in this country.

Cysticercosis.

The cystic stages of tapeworms which contain one head in a simple cyst are termed cysticerci. They are still given generic and specific names, although in reality this is rather undesirable. The following table shows the cystic stage, host, habitat, final host and habitat of the most important species of *Tœnia* giving rise to cysticerci:

Cysticercus.	*Intermediate Hosts.*	*Habitat.*	*Adult Tapeworm.*	*Final Host.*	*Habitat.*
C. cellulosœ ..	Pig, dog, man	Muscles	*T. solium*	Man	Intestines
C. bovis ..	Ox	Muscles of mastication	*T. saginata*	,,	,,
C. ovis ..	Sheep	Muscles and heart	*T. ovis* ..	Dog	,,
C. tenuicollis ..	Ox, sheep, goat, pig	Peritoneal cavity	*T. marginata*	,,	,,
C. pisiformis ..	Rabbit and hare	Peritoneal cavity	*T. serrata* ..	,,	,,
C. elongatus ..	Rabbit	Peritoneal cavity	—	—	—
C. fasciolaris ..	Rat and mouse	Liver	*T. crassicollis*	Cat	Intestines

With the possible exception of *C. tenuicollis*, clinical pictures of cysticercosis are very rare; in this case, however, in the pig and goat a heavy exposure to infection has sometimes resulted in the liver becoming a veritable mass of small cysts (on their way to the peritoneal cavity), and from which the animals have died. Occasionally, at the abattoir one still comes across pigs affected with *C. cellulosæ* (pork measles). Infection has then taken place from a human source. Abroad, *C. bovis* (beef measles) is not rare, but here it is seldom seen, although the adult worm, *T. saginata*, is occasionally found in persons who have not been out of the country. The remaining cysts will receive attention under the section devoted to preventive measures for their respective adults.

Echinococcosis (Hydatid Disease).

Echinococcus cysts contain one or more cavities with brood capsules containing potential tapeworm heads. The adult worm is *T. echinococcus* of the dog. The cysts are rounded, and vary in size from that of a nut to that of a child's head; daughter cysts may be endogenous or exogenous. The vesicular fluid is usually sterile. All the domestic animals and man are liable to be attacked, but it is much more common in the sheep, pig, and ox. The horse is more rarely affected, and the dog still less often. The liver appears to be a common seat of the cyst, and organs scaling over a hundredweight have been recorded. The lungs come next in frequency of invasion. The other tissues are less often affected, but it has been found in the brain, muscles, spleen, kidney, lymphatic glands, uterus, bones, and udder.

Treatment.—Generally speaking, treatment is unsatisfactory, and the diagnosis of the presence of hydatid cyst is even more so; badly infested animals show, at the best, only obscure symptoms. In some cases surgical removal is possible.

Prophylaxis and Prevention.—The extent to which hydatid disease is found in this country, either at post-mortem examination or at the abattoir, suggests that the tapeworm from which it is derived—viz., *T. echinococcus*—is much more prevalent than records seem to indicate. Quite possibly, being so small, it is not discovered unless specially sought. In addition to the dog and cat, a number of other allied carnivora have been shown to harbour the parasite. All condemned material containing hydatid cysts from abattoirs and knackeries should be subjected to a temperature sufficient to destroy them, and the by-laws prohibiting dogs from entering slaughtering premises should be rigidly enforced. Personally, the writer has no knowledge of the efficacy of tænifuges against the adult tapeworm, but affected animals at large must be regarded as a serious menace to the health of man and the domesticated animals.

Tæniasis.

Although there are now recognized many genera of tapeworms, it is customary to regard all infestations with them as tæniasis.

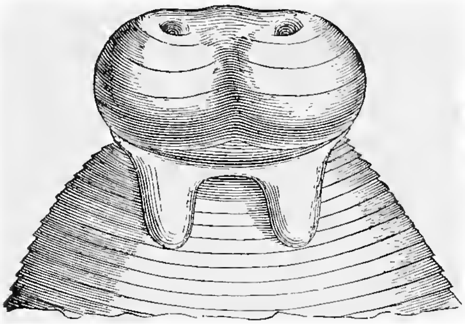

Fig. 105.—Cephalic Extremity of Anoplocephala perfoliata (× 12). (Railliet.)

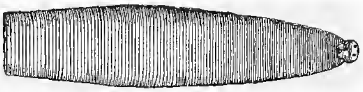

Fig. 106.—Anoplocephala perfoliata: Horse. (Natural size, but incomplete.) (Railliet.)

Horse.—As a clinical condition, tæniasis of the horse is rare, although very occasionally segments of tapeworms may be found in the fæces. *Anoplocephala perfoliata* and *A. mamillana* occur in the large bowel, and *A. magna* (*A. plicata*) in the small intestine. It is generally claimed that after a prolonged fast the administration of a full dose of linseed oil and turpentine will expel many of these unarmed parasites. The dose of oleoresin of aspidium (U.S.P.) for the horse is 1 dram, and of ethereal extract of male fern (B.P.) 2 to 5 drams, according to the size of the animal; favourable results have also been claimed by the use of these preparations. In the absence of any knowledge of the life histories of these worms, it is not possible to lay down preventive measures.

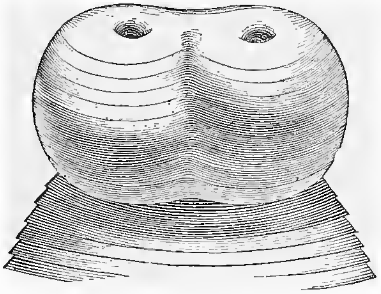

Fig. 107.—Cephalic Extremity of Anoplocephala plicata: Horse (× 10). (Railliet.)

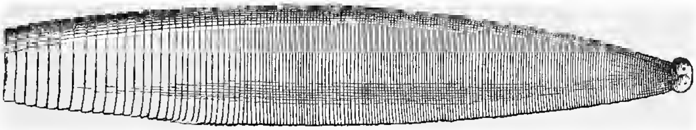

Fig. 108.—Anoplocephala plicata. (Natural size.) (Railliet.)

Pig.—Save for one or two records which are not of clinical importance, tapeworms are not found in swine.

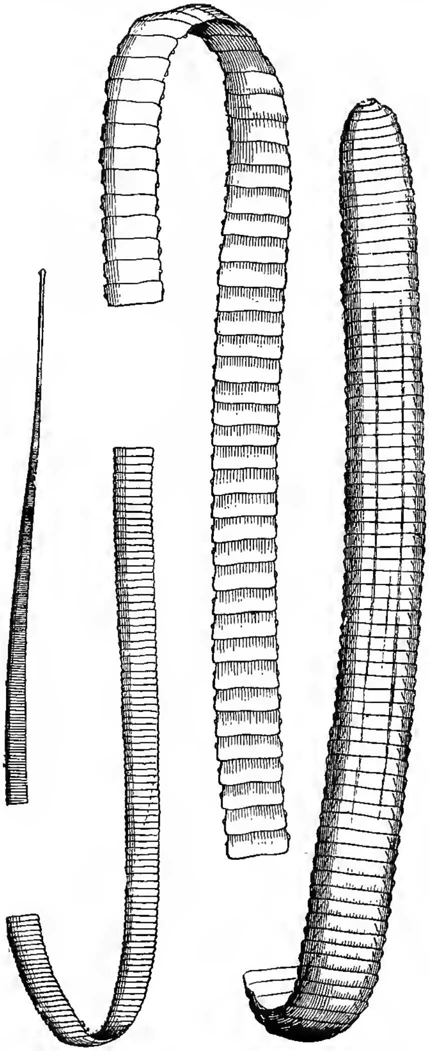

Fig. 109.—Moniezia expansa: Ruminant. (Natural size.) (Railliet.)

Ox.—A number of different species of tapeworms occur in the small intestines of cattle, and although segments of such worms may be discovered at times in the dung, one rarely, if ever, has to treat bovine tæniasis. On post-mortem examination in this country the writer has found *Moniezia planissima* and *M. alba* to be the most often encountered species. Like all the other tapeworms of cattle, they are unarmed and their life histories are unknown.

Sheep and Goats.—Although not common, the infestation of sheep and goats with tapeworms is sometimes serious, and then calls for treatment. In lambs I have found *Moniezia oblongiceps* present in large numbers. *M. planissima* and *M. alba* may also occur in this country. As in cattle, these parasites are unarmed, inhabit the small intestine, and their life histories are unknown.

Treatment.—Generally speaking, this is not at all satisfactory. The solution of copper sulphate, described for parasitic gastritis (p. 366), sometimes expels large numbers of these worms after fasting. The addition of 1 per cent. of powdered tobacco to this solution improves its value. The dose is then 1½ ounces for lambs and 3 ounces for older animals.

Other agents in use are freshly powdered areca nut (lambs 1 to 2 drams); oleoresin of male fern (U.S.P.), 1 dram in 3 ounces of ol. ricini. Kamala appears to upset lambs by causing diarrhœa and loss of appetite. Improved conditions of hygiene and good feeding are important adjuncts to treatment.

Prophylaxis and Prevention.—In view of the fact that the life histories of the ovine and caprine tapeworms are unknown, no exact measures for prevention can be laid down.

Dog.—The dog harbours many tapeworms; *Diphyllobothrium*, *Mesocestoides*, and several of the recently described species are rare. The most common worms which one is called upon to treat are *Dipylidium caninum*, *Tænia serialis* (=*Multiceps serialis*), and *T. serrata* (=*T. pisiformis*); less common are *T. marginata* (=*T. hydatigena*), *T. ovis*, *T. cœnurus*, and *T. echinococcus*. They are all found in the small intestine, are armed, and their life histories are well known.

Adult Tapeworm.	*Cystic Stage.*	*Intermediate Hosts.*	*Habitat.*
Dipylidium caninum	*Cryptocystis trichodectis*	*Pulex irritans*, *Ctenocephalus sp.*, *Trichodectes latus*	Abdominal cavity
T. serialis	*Cœnurus serialis*	Rabbit and hare	Subcutis and muscles
T. serrata	*Cysticercus pisiformis*	,, ,,	Abdominal cavity
T. marginata ..	*Cysticercus tenuicollis*	Ox, sheep, pig	Abdominal cavity
T. cœnurus	*Cœnurus cerebralis*	Sheep	Brain
T. ovis	*Cysticercus ovis*	,,	Muscles and heart
T. echinococcus ..	*Echinococcus polymorphus*	Many mammals	Liver, lungs, and muscles

Treatment.—The treatment of tapeworms in the dog is often too lightly undertaken, sometimes causing pain to the patients and inconvenience to their owners. If violent action of the bowels is suddenly brought about without previous preparation, the rectum may contain a large amount of dry, chalk-like fæces, and their passage is extremely painful. A dog voiding tapeworms whilst on the leash often causes embarrassment to the owner. A good brisk purgative should first be given, preferably a saline; this should be followed by a short diet of milk, and then a complete fast of twenty-four hours. If possible, the patient should be so placed that the stools passed after treatment can be found, examined, and destroyed by burning. Often, although several heads may be discovered in the expelled mass, there is direct evidence that some heads have remained behind. This fact no doubt explains those cases where it is stated that certain dogs are always getting tapeworms, the correct answer being that the original infestation persists, though perhaps to a lesser degree, after each medication. The drugs upon which most reliance can be placed are freshly powdered areca nut and extract of male shield fern, either singly or combined. It is usual to offer areca nut in a little milk or butter, the dose being 2 grains per pound body weight. If it is combined with male fern extract (10 to 15 minims according to the size of the patient), a grain per pound body weight is given. Male fern should not be given in oil, as this favours its absorption. If areca nut is vomited after administration, a little chloretone may first be given as a sedative. If purgation does not follow the use of areca nut in a few hours, a dose of castor oil should be offered. When an examination of the voided

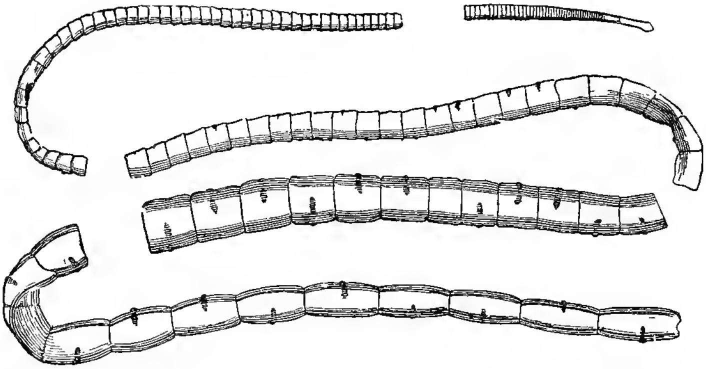

FIG. 110.—TÆNIA SERRATA: DOG. (Natural size.) (Railliet.)

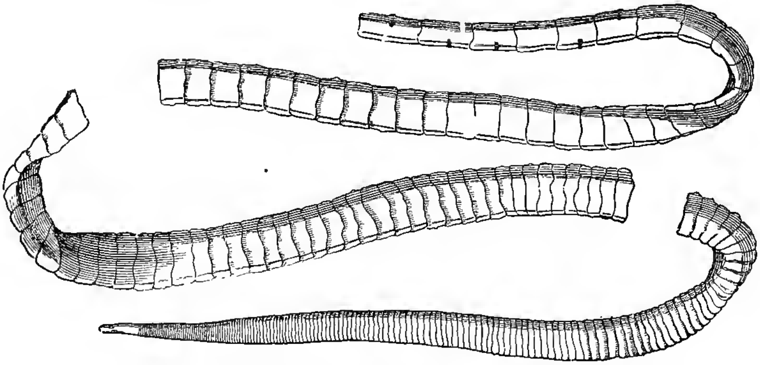

FIG. 111.—TÆNIA MARGINATA: DOG. (Natural size.)
(Neumann's "Parasites.")

material shows that some heads have remained behind, a further course of treatment will be necessary in a period varying from one to a few weeks.

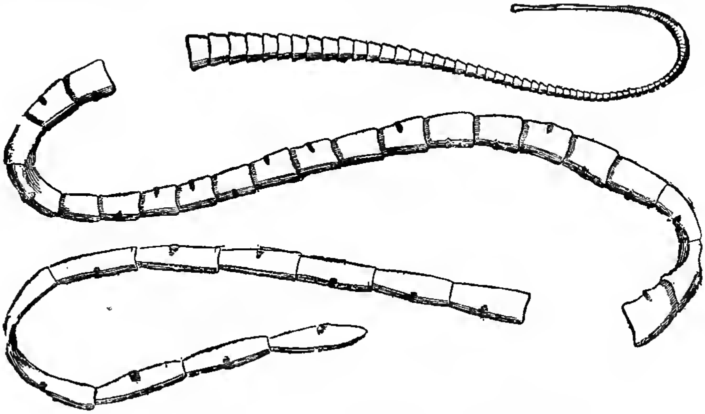

FIG. 112.—TÆNIA CŒNURUS: DOG. (Natural size.) (Neumann's "Parasites.")

There are several preparations of a proprietary nature which contain the desirable features of areca nut without its objectionable ones, and which are of great value in the treatment of canine tapeworms. Suitable capsules of anthelmintics for combined action against both cestodes and nematodes are also obtainable.

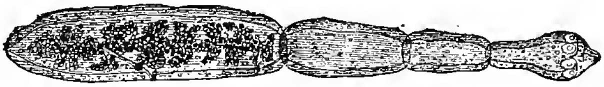

FIG. 113.—TÆNIA ECHINOCOCCUS: DOG. (Magnified.) (Perroncito.)

Prophylaxis.—The control of tapeworm infestation depends upon the identification of the species present, and then preventing dogs from gaining access to the cystic forms. With the possible exception of *D. caninum* and *T. echinococcus*, the canine tapeworms can only be identified by microscopic methods.

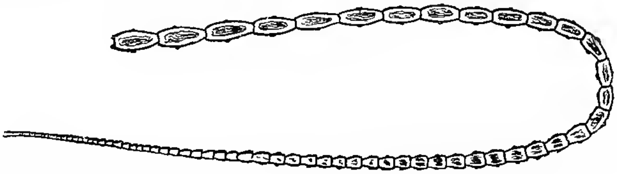

FIG. 114.—DIPYLIDIUM CANINUM: DOG. (Small specimen, natural size.) (Railliet.)

No doubt in towns the cystic forms of *T. serialis* and *T. serrata* are most often obtained from discarded limbs and viscera of rabbits in game shops, and from similar sources in the field, on farms, or shoots. *T. marginata* will result from slaughter-house refuse, or where " bladders " are trimmed off the viscera of cattle, sheep, and swine. The relationship of *T. cœnurus* to the gid parasite of the sheep's head is well known. In treating dogs for *D. caninum*, the result is bound to be unsatisfactory unless an attack is also made upon the carriers of the cystic form (*Cryptocystis trichodectis*)—viz., the fleas and lice (*Pulex irritans*, *Ctenocephalus sp.*, and *Trichodectes latus*).

Prevention consists in a strict avoidance of discarded materials likely to harbour cystic forms of canine tapeworms; the systematic destruction by heat of all viscera and muscles containing tapeworm cysts; and a constant supervision of the skin, bedding, and kennel to keep down ectozoa which harbour *Dipylidium* cysts.

Cat.—The two important and frequently encountered tapeworms of the cat are *D. caninum* and *T. crassicollis* (*T. tæniæformis*). The cystic stage of the latter (*Cysticercus fasciolaris*) is found in the liver of rats and mice, so that the control of infection is somewhat paradoxical; but where cats are kept to keep down these pests an attempt should be made to limit the number of cysts in rats and mice by the early treatment of tæniasis in cats in a somewhat similar manner, but with smaller doses, as described above for the dog.

Birds.—A large number of species of small tapeworms occur in fowls and ducks, but the number in geese, turkeys, and pigeons is smaller. When the examination of the fæces establishes that tapeworms are the cause of an enzoötic, remedial and preventive measures have to be adopted. Of areca nut, geese take about 1 dram, fowls 30 grains, and pigeons 15 grains; but smaller doses must be given to younger birds. Isolation of the infected, burning of fæces, and disinfection of runs and houses are the usual preventive measures adopted.

ANNELIDA.

Numerous species of leeches attack the first portions of the respiratory and alimentary tracts of many animals. However, a number of them found in slow streams and ponds are incapable of fixing themselves on the mucosæ. Great numbers of the blood-sucking species may fasten themselves on the lips, mouth, nose, upper air passages, pharynx, and larynx, and give rise in some cases to alarming symptoms of an asphyxiating nature, with œdema of the glottis. *Hæmopis* and *Limnatis* are the genera which most often attack our patients.

Treatment.—When visible, leeches are removed by the hand in a cloth, but in other situations a sponge on a piece of cane or like material, and soaked in a solution of salt or acetic acid, will have to be employed, and may be in conjunction with the torch and mouth speculum.

Prevention.—It is usually the young forms found on the surface of infested waters which attack animals. Drinking places should be freed from mud; eels are said to destroy leeches; filtered water in knee-high troughs prevents infestation. On expeditions, calico muzzle-like bags for the noses of animals may be employed when drinking.

In addition to the above parasites, which are termed water leeches, there is a group of which the genus *Hæmadipsa* is the most important, known as land leeches. In some countries these attack the limbs of many animals, as well as man. Their attacks on the skin can only be prevented by covering the parts liable to invasion with bandages.

LINGUATULIDA.

Parasitic Rhinitis.

Occasionally in this country, and more often abroad, chronic irritation of the mucous membrane of the upper air passages of the dog is due to a degenerate arachnidan—viz., *Linguatula lanceolata* (*L. denticulata*, *Pentastoma tænioides*). Animals become infected by taking in the larval stage from the lungs, liver, and mesenteric glands of horses, ruminants, and rodents. The discharge from the nose is often blood-stained, and contains characteristic yellowish-brown ova. Antiseptic and irritant solutions are sometimes injected with a view to dislodging the parasites. The results are, however, far from satisfactory. Benzine and weak solutions of ammonia are most often used.

The life history indicates the lines which must be followed in attempts to control the parasite. In this direction the destruction of affected organs and debarring dogs from slaughter-houses are the most important factors. The affected dog is the primary cause of infection in those animals which harbour the larval form.

ACARINA.

Follicular Mange (Demodectic Mange).

A large number of species of the genus *Demodex* are known to occur upon domestic and wild mammals. They are parasites of the hair follicles and sebaceous glands. In many instances their presence does not appear to cause serious consequences, and when they are found in the typical pustular lesions micro-organisms of the coccus type are also present.

Horse.—*Demodex equi* may often be found in skin scrapings which contain large numbers of other mange mites, but by some it is regarded as being responsible for a definite pustular condition most commonly seen on the lower half of the neck, withers, and base of the tail. It is apparently preceded by an excessive pruritus without apparent lesions save for an excessive amount of epidermal scales.

Treatment.—For the early stage, one or two complete dressings of sulphur in a non-irritant oil appear to be most suitable when preceded by complete clipping and followed by washing. In the pustular stage considerable difficulty is experienced in getting rid of the lesion, and it is often after prolonged treatment by the dressings used in other forms of mange that one can rely upon a cure. Even then relapses are not rare. The control of the disease and its prevention must be in accordance with the general recommendations made with regard to mange on p. 384.

Ox.—*Demodex bovis* lesions occur on the neck, shoulders, and body as hairless nodules about the size of hazel nuts. In Europe the disease is uncommon, but frequent references are made to it in tropical reports.

Goat.—The lesions of *Demodex capræ* are somewhat similar to those of the ox, and occur on the head, neck, body, and legs.

Pig.—*Demodex phylloides* lives in the sebaceous glands in situations where the skin is thin, such as the snout, cheeks, sides of neck, belly, and inside the thighs. The pustule varies in size from a millet seed to a pea, and sometimes a little larger. On the belly, after breaking, the pustules give rise to ulcers which have very little tendency to heal. It is rare that one is called upon to treat any of the food animals. The careful evacuation of ripe pustules, followed by the application of the agents mentioned for the disease in the dog, appear to be the lines to be adopted.

Dog.—*Demodex canis* is said to be responsible for two forms of follicular mange—viz., the squamous and the pustular, terms which indicate fairly well the nature of each. Both are at times prevalent, a crop of cases often being encountered without any apparent association.

Treatment.—The treatment of this acariasis has always been eminently unsatisfactory, and this is hardly to be wondered at when one takes into consideration the position of the parasites. Nearly all the important external parasiticides have at one time or another been employed, with varying results. Internal medication with sulphur, iodine, and arsenic containing compounds has been lauded by some workers. Intradermal injections of certain antiseptics such as carbolic acid have been claimed by others to be satisfactory, and yet, again, good results have been recorded from the employment of autogenous vaccines. It would appear that the results depend upon the degree of infestation, the parts affected, the age and habits of the animal, and the persistence and attention to detail shown by the attendant and veterinary surgeon. A great amount of research is yet necessary before the treatment of this disease is brought into line with that employed for other parasitic conditions. The sum total of to-day's experience is that in anything but slight cases it is most economical, humane, and best to destroy. In cases where treatment is undertaken it is likely to be lengthy, full of disappointment, and to be accompanied by relapses and recurrences. There appears to be no doubt that it is possible to find the *Demodex* on the normal skin in cases of other skin disease, as well as in vast numbers in the lesion for which it is either primarily or secondarily responsible. Herein lies a possible explanation

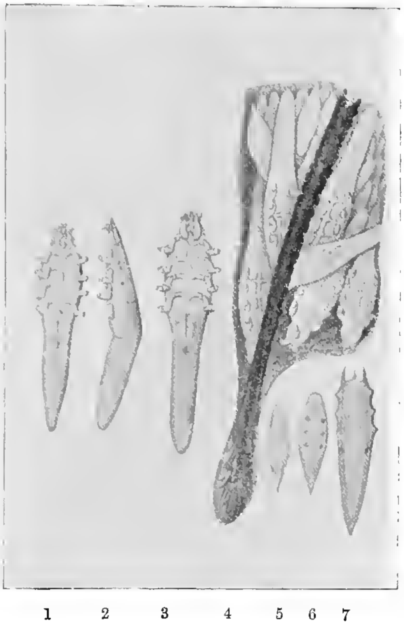

FIG. 115.—DEMODEX CANIS (×130). (After Megnin.)

1, Male, ventral aspect; 2, male, lateral aspect; 3, female, ventral aspect; 4, hair follicle containing acari in different stages of development; 5 and 6, larvæ; 7, nymph.

(From Pillers' "Mange and Allied Mites.")

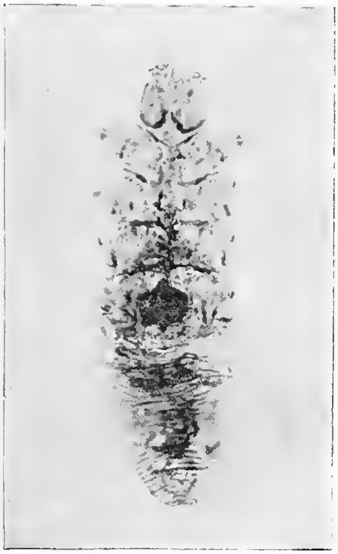

FIG. 116.—DEMODEX EQUI (×250).

From a sarcoptic positive skin scraping of a horse.

(From Pillers' "Mange and Allied Mites.")

of the contradictory results obtained in treatment and transmission. Following such an unfavourable introduction, an encyclopædic list of treatment will not be given, but one or two forms only as a means of indicating the lines upon which attempts at restoration to the normal must follow.

The systemic treatment, diet, management, and sanitary measures must follow the usual approved lines.

In the pustular form, after clipping the hair over the affected areas, there are several ointments or liniments which are in fairly common use. Hunting recommended the application of 1 part of creosote, 2 parts of liquor potassæ, in 14 parts of olive oil.

An ointment composed of equal parts of gum styrax, salicylic acid, and sulphur in lanoline, often appears to be of value. Siedamgrotzky's system of treatment consisted in opening all available pustules, lathering the parts with terebene soap, and then applying daily balsam of Peru in 4 parts of spirit.

Schindelka, in the section he contributed on skin diseases in Bayer and Frohner's "System of Surgery," appears to have obtained very satisfactory results by carefully cleansing, clipping, and then applying pads of cotton-wool soaked in carbon bisulphide for several minutes. After this a paste containing liquor formaldehydum, 1 to 3 parts; starch, 25 parts; zinc oxide, 25 parts; and vaseline, 50 parts, was used. Three to five dressings at intervals of three to four days are claimed as being sufficient to bring about a cure. Where the skin is markedly thickened, instead of pure carbon bisulphide, a shake mixture of 1 part of sublimed sulphur and 2 parts of powdered neutral soap in 7 parts of it is recommended. The inflammable nature of carbon bisulphide must not be lost sight of. In the squamous form, after removing the scales with ointments or oily preparations of salicylic acid, balsam of Peru in spirit is extremely useful.

Many of the other treatments are also likely to give better results here than in the pustular form. As newer preparations for the treatment of skin affections become available many of them are used in the treatment of this disease, and after a period of apparent utility they seem to drop into disrepute.

Prophylaxis.—The control of follicular mange in a kennel is usually not difficult, and one encounters many apparent anomalies with regard to transmission. The measures to be adopted must follow the general lines more fully gone into under the heading of Mange (p. 384).

Prevention.—What has been said above with regard to prophylaxis applies equally to this aspect of control. The affected dog and in-contact material, whether show-pens or kennels, are, however, the most important factors in spreading the disease.

[*Editor's Note.*—In obstinate old-standing cases the writer is of opinion it is not so much the parasite that the therapist has to fight against, as it is pathogenic organisms, and the consequent burrowing tryptic action of their product—*i.e.*, pus. On this principle the following line of treatment has been carried out for some years: The animal is placed under a seven to fourteen days' course of citrate of soda, 5 to 10 grains night and morning in food, followed by 5 to 10 grains of lactate of calcium. A swab is taken from a deep pocket, and from this an autogenous vaccine is made, the organisms present usually being of the pus-producing type.

Locally the crusts are removed by washing with soda water and scraping, after which each pocket is packed with equal parts of chloride of sodium and citrate of soda. Twenty-four hours later the affected area is painted with an aqueous solution of 2 per cent. picric acid, then the brush soaked in the solution is inserted into each pocket. In three or four days' time the scabs are again removed and the dressing repeated. Later on an ointment composed of boric acid and prepared chalk is applied daily to the parts. Once a week the animal is given a warm bath heavily charged with fine bran and flower of sulphur.]

Mange (Scabies, Itch).

The manges are due to a number of different species of several genera of acari. They receive a great number of popular names according to the parts affected, animals or birds affected, and the locality. With due consideration to the differences in habits and coverings of horses, cattle, sheep, swine, dogs, cats, rabbits, ferrets, and birds, the broad principles of treatment, prophylaxis, and prevention are somewhat similar, yet in their application the details are very different.

General Remarks on Treatment.—Wherever possible, the covering of the skin should be removed by close clipping, so that scales can be removed, a small quantity of dressing used, or easily removed by washing, if it be of an oily or fatty nature. In sheep, swine, birds, cats, and rabbits, and in the case of shires' legs, this cannot be done, and consequently details become more difficult of fulfilment. It is unnecessary in otoacariasis and scaly leg. Complete removal of the covering brings to light incipient lesions and also prevents spread. In those species where it is possible, the next step is the complete removal by means of hot creolinated water and soda of all the epidermal proliferation in which so many of the adult, immature forms and eggs are to be found. After this, the parasiticide should be applied to the affected parts, and the remainder of the body treated with a similar or weaker preparation. The period between dressings should be as long as is consistent with the possibility of killing all the parasites, and not allowing a fresh generation to appear. Dressings should be non-toxic, not blister the skin, or cause loss of flesh. Oily dressings must be moved daily with a piece of cloth, or the products of the skin will be held in position. With a long coat the most bland oil is likely to cause a falling out of normal hair. In animals which are clothed in cold weather, the cloths take up dressing and are often responsible for reinfection. The stall, pen, or box containing the patient must be carefully disinfected when the animal is washed, and the same applies to its means of fastening. In otoacariasis and in the carnivora the feet may convey the disease to other parts. Bedding is a means of reinfection between dressings. After the prescribed period "in dressing," the application will have to be removed by hot washing, if it is an oily or fatty one. This is a detail requiring great care and thoroughness; if improperly done, a thick layer with consequent matting occurs; if it is too hot, there is cracking of the skin. After a short period redressing is necessary. In the meantime the skin should be subjected to a vigorous hygiene; coincident with cutaneous treatment, good surroundings, food, and plenty of exercise are often necessary. Success depends upon minute attention to detail, and it is by this alone that the duration of treatment is reduced to a minimum, blistering avoided, and a dermatitis worse than the disease itself prevented.

General Remarks on Prophylaxis.—When a case of scabies occurs, the affected animal and all its belongings must be isolated. The stall, box, or pen must be cleaned and the material burned. After this, scalding out with boiling water, disinfecting, and lime-washing, or a suitable substitute are necessary. Separate grooming utensils become absolutely necessary. In the case of fields or pens harbouring many animals, this can be effectively done by leaving them empty as long as possible, or at least a month. Animals which have been in contact with an affected one, or have been otherwise exposed to infection by having used the same harness, stall, kennel, or perch, as the case may be, should be treated with some reliable antiparasitic dressing. As a general recommendation, anything or any chance, either direct or indirect, which is capable of transmitting the disease must be checked. Affected dead animals should be moved whilst still warm, because acari soon leave them on cooling.

General Remarks on Prevention.—It is extremely difficult to be sure that an animal or bird has not a few mites on it, and so be the carrier of mange. In the healthy stable, byre, fold, kennel, or pen, the safest way is to isolate new arrivals pending a decision as to the condition of their skins. Regular attention to the hygiene of the skin in the way of grooming, clipping, washing, wallowing, and dust bathing, are important. Clipping in horses is the best preventive there is, and a set of harness and grooming tools for each animal, with no interchanging, completes the desired safety. The commercial markets and show-pens are a fruitful means of exposing healthy animals to infection, so that careful inspection at markets, shows, with general disinfection of pens after having once been used, and attention to crates, railway vehicles, and ships, are important points in the prevention of the manges. In the smaller animals, at least, latent cases of disease upon animals visiting other premises for stud purposes have been the means of causing outbreaks. Most of the manges have a marked seasonal prevalence, and at these times special attention will have to be paid to any animals which have been off the premises for other than ordinary movements.

Most Important Manges.

Parasite.	*Hosts.*	*Habitat.*	*Occasional Hosts.*
Sarcoptes equi	Horse	Skin generally	Man, ox
,, *bovis*	Ox	,, ,,	Man
,, *ovis*	Sheep	Legs and face	Man, goat, pig
,, *capræ*	Goat	Head	Man, sheep, ox, pig
,, *suis*	Pig	,,	Man
,, *canis*	Dog	,,	,,
,, *cuniculi*	Rabbit	,,	Ferret and guinea-pig
,, *hydrochoeri* ..	Ferret	Feet and tail	—
Notœdres cati	Cat	Head	—
,, *notœdres*	Rat, mouse	Ears and tail	—
,, *cuniculi*	Rabbit	Head	—
Cnemidocoptes mutans ..	Fowl, turkey, pheasant	Legs	—
,, *gallinæ* ..	Fowl	Feathers	—
,, *lævis* ..	Pigeon	,,	—
Psoroptes equi	Horse, ass mule	Skin	—
,, *bovis*	Ox	,,	—
,, *ovis*	Sheep	,,	—
,, *capræ*	Goat	Ears	—
,, *cuniculi*	Rabbit	,,	—
Chorioptes equi	Horse	Legs	—
,, *bovis*	Ox	Tail	—
,, *capræ*	Goat	Skin	—
,, *ovis*	Sheep	Legs	—
,, *cuniculi*	Rabbit	Ears	—
Otodectes cynotes	Dog	,,	—
,, *felis*	Cat	,,	—
,, *furonis*	Ferret	,,	—

Sarcoptic Mange.

Sarcoptic scabies is due to different species of *Sarcoptes*. After fecundation, the female burrows into the superficial layers of the skin. It is thus more serious and more difficult to cure than the other forms of scabies. Although the disease is liable to affect nearly all the domesticated animals, it is only worthy of serious consideration in horses, cattle, swine, dogs, and ferrets.

Horse.—In equines at the present time, sarcoptic mange is most prevalent and forms the majority of reportable cases.

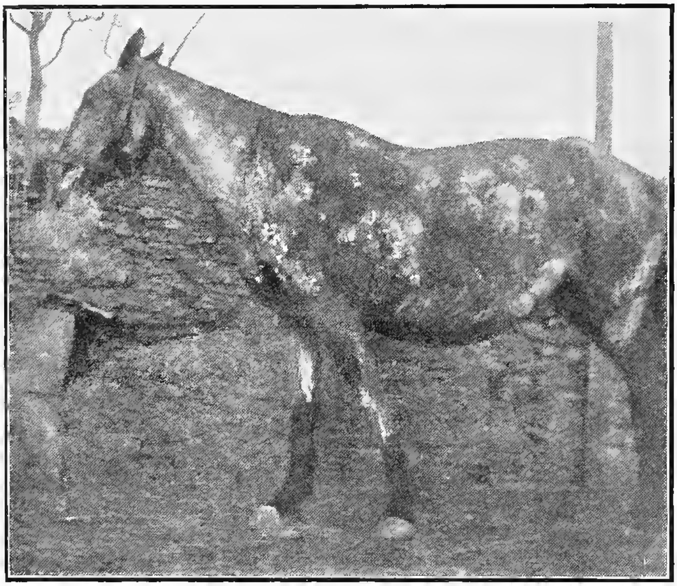

FIG. 117.—SARCOPTIC SCABIES: AN ADVANCED CASE.

Treatment.—The chief factors in the successful treatment of equine sarcoptic mange are minute attention to detail, with the application of non-blistering medicated dressings. The actual form of treatment depends upon the numbers and conditions under which they have to be treated. Although oily preparations are best in ordinary practice, watery solutions are used when great numbers have to be passed through the dipping vat. Again, the erection of a special chamber, into which sulphur dioxide can be passed from a generator, such as is in common use for sanitary purposes, is, under suitable conditions, a very satisfactory means of treatment. It is stated that clipping is then unnecessary, and if the patients are placed in the chamber when sweating, excellent results are obtained. The treatment of this form of mange is, unfortunately, often not undertaken early enough. Being more prevalent when the coat is long, and starting as a number of isolated papules which are irritable, it does not cause so much attention as the circumscribed bald patch of the psoroptic form. The average case, therefore, presents a thickened skin, starting from the ventral surface, with a diffuse appearance of, here and there, hairs and lesions, as contrasted with localized areas along the dorsum with very little thickening of the skin in psoroptic mange. On the first day complete close clipping is therefore essential; this must be followed by soaking of the epidermal accumulation in hot water and plenty of non-irritant soap. After this, and especially so in a bad case, all the abnormal detritus must be removed. The scraper must be used with care, and if the water is much over 120° F. cracking of the superficial new layers will result later on. After thorough drying the dressing is applied. According to its composition, the whole, half, or a third of the body will be dressed at a time. In badly ventilated buildings and with fat animals care should be used; even a bland oil may cause increased respirations, and others bring about blistering or a some-

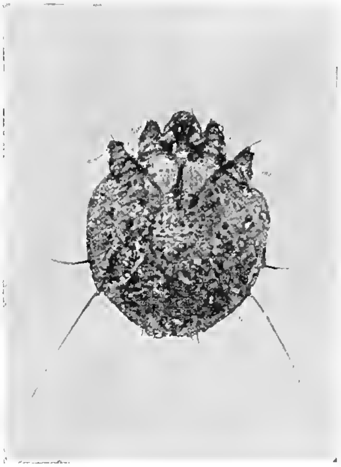

FIG. 118.—SARCOPTES EQUI (× 150): NYMPH, VENTRAL ASPECT.
(From Pillers' "Mange and Allied Mites.")

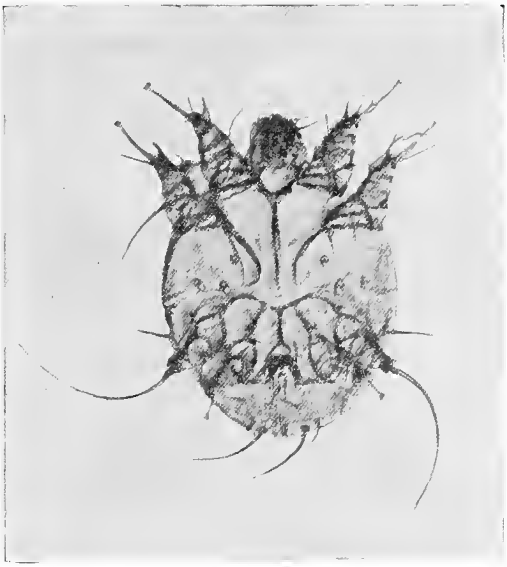

FIG. 119.—SARCOPTES SUIS (APPROXIMATELY × 135): MALE, VENTRAL ASPECT.
(From Pillers' "Mange and Allied Mites.")

what similar condition. If the dressing is of an oily nature, only sufficient to leave the skin moist must be left on, and, moreover, it must be briskly moved with a cloth all over the body daily for four days; any parts becoming dry will require a fresh application. After this, the animal will require very careful washing and drying, and this will be followed by a day or so's hard grooming. With care and disinfection of the stable and halter, three such courses of treatment should effect a cure, and after this the animal can be worked from isolation. The following may be regarded as useful formulæ:

I.	Strong solution of calcium polysulphides (1 part)	8 oz.
	Water (2 parts)	16 ,,
	Horse fat (2 parts)	16 ,,
		2 pints.

The strong solution of calcium polysulphide is prepared from 2¼ pounds of sulphur, 1 pound of good quicklime, and 1 gallon of water in a similar manner to the lime and sulphur dip mentioned for sheep scab (p. 394).

II.	Sulphur sub.	2½ lb.
	Ol. cetacei	1 gal.
III.	Creosote	1 part.
	Ol. cetacei	20 parts.
IV.	Kerosene	1 pt.
	Soap	1 lb.
	Water	1 gal.
V.	Creolin	5 oz.
	Soap	1 lb.
	Water	1 gal.

With III. not more than half the body should be done at a time; the value of both IV. and V. is the ease with which they can be washed off. All dressings should be about 110° F. when applied. Very satisfactory results are often obtained when sulphur has been used in a mild soft soap. A detailed system such as the following is essential:

First day	Clip.
Second day	Wash.
Third day	Dress.
Fourth to eighth day	Touch up dressing.
Ninth day	Rewash.
Tenth day	Groom, exercise, reclip, and, if necessary, repeat as from third day.

After apparent cure, monthly washings in a watery dressing are necessary for the following few months to prevent recurrence.

Prophylaxis.—All infected stabling, grooming kit, and harness must be subjected to suitable means of disinfection. All in-contact horses require washing or spraying with a recognized wash, such as the lime and sulphur dip mentioned on p. 394. The strictest isolation of cases when under treatment, and for some period afterwards, is essential. The clandestine changing of grooming tools and harness is a common means of spreading the disease.

Prevention.—Early and repeated clipping is the surest way of preventing the spread of mange. It should be done in a special place, and all hair burnt. New arrivals should be kept under careful observation. The practice of boys riding horses home from the shoeing forge may cause the introduction of the disease into a clean stock. Other aspects of control include livery stables and all forms of contact. Good grooming is also an important factor in prevention. Equine sarcoptic mange is a scheduled disease.

Sarcoptic Mange of the Ox.—Sarcoptic mange is the commonest skin disease of housed cattle, and were it not for the fact that town cows nearly all go to the abattoir, it would soon become a serious disease in them. To ensure success, the details of treatment should be similar to those given for the horse, although objection is often taken to the important item of clipping.

Preparations containing creolin or creosote should not be used where licking is possible, and the greatest care to prevent contamination of the milk is necessary when the hinder aspect of the udder has to be treated. Warm washing will remove the accumulations on the skin before and between dressings, and an ointment of 1 part of sulphur in 6 parts of warm lard at five-day intervals is a very suitable application for diseased areas. Non-affected parts can be treated with a recognized non-toxic dip.

Prophylaxis and Prevention.—Grooming and the milker appear to be the most important means of spreading the disease. The control of these, together with measures of isolation, disinfection, and treating in-contacts should keep the disease in check.

Sarcoptic Mange of the Pig.—This disease is common enough to merit more serious attention than it appears to receive at the present moment. Abroad, when it is prevalent, dipping in lime and sulphur dips is resorted to. In this country these preparations can be used as sprays for in-contacts. Affected animals are carefully washed, scrubbed, dried, and placed on a saw-dusted floor. Helmerich's ointment (sulphur sublimate 2 parts, potassium bicarbonate 1 part, lard 8 parts) for three dressings, at intervals of five days, with washing before fresh applications, should effect a cure. The spray can be used on those parts of the body which appear to be free from lesions. Creosote 1 part in 20 to 25 parts of warm lard is also recommended as a principal dressing.

Prophylaxis and Prevention.—Rubbing posts, wallows, bedding, sheds, crates, carts, and the boar need special attention, in addition to the ordinary channels of spread.

Sarcoptic Mange of the Dog.—In dogs the form of treatment depends upon a number of conditions, mostly unassociated with the patient itself. Despite the appearance produced thereby, clipping is advisable, as it appreciably shortens the duration of treatment. After this a good lathering and soaking in a spirit and soap solution will allow the scales to be removed with a brush. When all the soap has been rinsed out with warm water and the patient dried, the active dressing can be applied. Generally speaking, about a quarter of the body should be covered at a time, and three or four days after the whole has been so dressed complete washing is carried out. (1) Sulphur 2 parts, potassium bicarbonate 1 part, and warm lard 8 parts is a valuable dressing. (2) Creosote 1 part in 20 parts of oil is suitable for the larger breeds. (3) A dressing containing 1 part of creolin in 16 parts of a spirit and soap solution (8 parts of each) is comparatively easy to remove by washing. (4) For localized areas, where clipping is not carried out, naphthaline 1 part, vaseline 2 parts, and a few drops of oil of thyme and lavender will be found soothing and agreeable. It is suitable for pets, and must be accompanied by complete washing in milder antiparasitics.

Mercury, tobacco, tar, and other toxic substances are, on account of their nature, unsuited for canines. Even with other dressings attempts should be made to prevent licking and scratching.

Prophylaxis and Prevention.—The usual precautions with regard to disinfection of kennels and tools, isolation of the affected, and washing of in-contacts should be adopted. The show-pen, stud visits, and promiscuous intercourse in the streets deserve to have special attention paid to them.

Sarcoptic Mange of the Sheep and Goat.—In the sheep the scabs (blacknose) on the face should be removed by softening, and sulphur ointment should then be applied as directed for other animals. The condition is rare, but when it does exist it is not always likely to be cured by simple double dipping methods. Goats do not stand dipping very well. It is therefore best to clip them and apply sulphur ointment or a creosote preparation in the routine manner.

Sarcoptic Mange of the Ferret.—The earliest lesions of sarcoptic scabies of the ferret occur on the plantar surfaces of the feet. Hence the name foot-rot. However, in neglected cases the tail, head, and even other parts of the body, may be affected. It is thought that infection is picked up in rabbit burrows, not from rabbits, rats, or dogs, but from species allied to the ferret, such as the stoat or polecat.

If the large amount of deposit is carelessly or suddenly removed from the feet, severe bleeding results. It is best to soak the parts in glycerine and then remove by gentle friction. After this the application of a sulphur ointment is recommended. Repeated cleansing and disinfection of hutches is an essential part of treatment to prevent reinfection. In breeding establishments a periodic inspection of all animals is advisable; those presenting symptoms should be isolated and treated. The in-contacts should have their feet smeared with sulphur ointment and their hutches disinfected. Affected animals should not be used for ratting or rabbiting, whilst bags and lines which have been used for them should be soaked in disinfectant and thoroughly dried.—*A. W. Noël Pillers.*

Sarcoptic Mange of the Camel.—The secret of obtaining good results in the treatment of mange is the care and attention to detail with which the treatment is carried out. There are a great variety of drugs by means of which the disease can be cured. Mange in camels being of the sarcoptic variety, at least three dressings, with an interval of about a week between each dressing, are necessary before a cure can be effected.

The principle of the treatment is the same in all cases, irrespective of the dressing applied, and consists of:

1. Clipping the camels as close as possible. This can be done either with scissors or with a clipping machine fitted with wool-shearing heads; the latter method is the better, as it does not take very long, whereas to clip a camel with scissors entails considerable expenditure of time and labour.

2. Washing the camel with soap and tepid water. The washing must be thoroughly done; the skin of a camel after clipping will be found to be very dirty, and, unless the dirt is removed, the dressing, when applied, will not come in contact with the parasite, and the parasite will consequently not be destroyed.

3. Cleaning the skin by grooming with a brush with strong bristles. Unless the dirt is removed from the skin of the camel it affords protection to the parasite, and prevents the dressing coming in contact with the parasite, and the latter escapes destruction. The cleaning of the skin and removal of all dirt before the application of the dressing is as important in the treatment of mange as is the application of the dressing. Unless this fact is appreciated, good results will not be obtained in the treatment of mange.

4. The application of a dressing, either watery, oily, or greasy, to destroy the parasite.

5. An interval of time—say a week—to elapse to allow the parasites to hatch out from eggs underneath the skin and to come to the surface.

6. A second application of the dressing.

7. Another interval of a week to allow any more parasites which had not already hatched out to come to the surface.

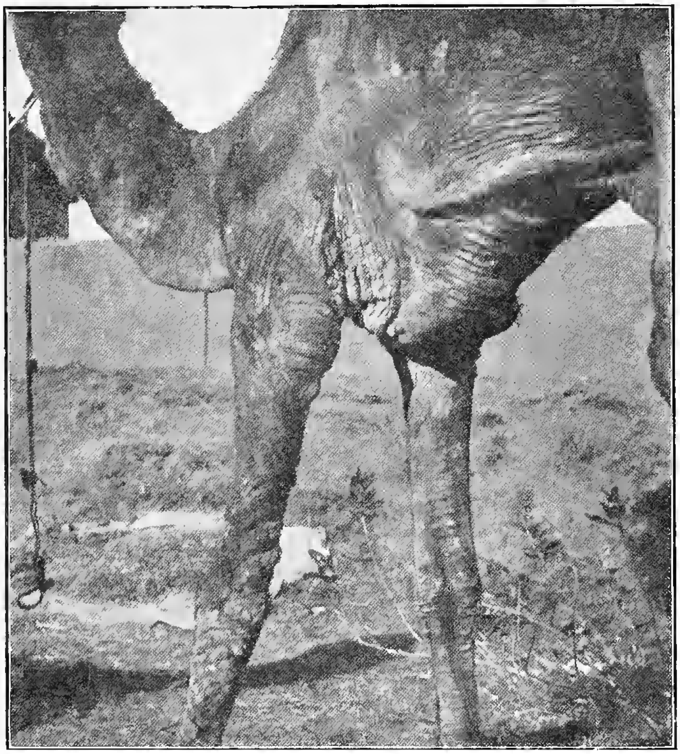

FIG. 120.—SARCOPTIC SCABIES (CAMEL), SHOWING THICKENING OF SKIN. (Cross, "Diseases of the Camel.")

8. A third application of the dressing.

9. Removal of the dressings the second day after application by washing with soap and water.

Three applications at least are necessary to effect a cure.

The dressings used may be watery solutions of the coal-tar preparation, solutions of other antiseptics, a solution of calcium sulphide, sulphurous acid gas, bland oils, used alone or combined with sulphur, or taramira oil (*Eruca sativa*).

Dressing with Coal-Tar Preparations and Other Antiseptics.—The preparations used are watery solutions of phenyl, cresol, carbolic, chinosol, etc. These dressings are best applied by forcing the camel into a "dipping bath"; if a bath is unavailable, the dressing may be sprayed on to the camel by means of a spraying pump. Care must be taken that none of the dip comes in contact with the eyes and that none is swallowed by the animal. When a dipping bath is used, the dressing should be applied to the hump, back, and neck, by means of brushes with long handles, and the dressing should be applied to the head by rubbing it over with a cloth soaked with the solution. After the removal of the camel from the bath he should be walked up and down until he is dry. No dipping should take place on a cloudy day, or if a strong wind is blowing. A sunny day when no wind is blowing should be selected.

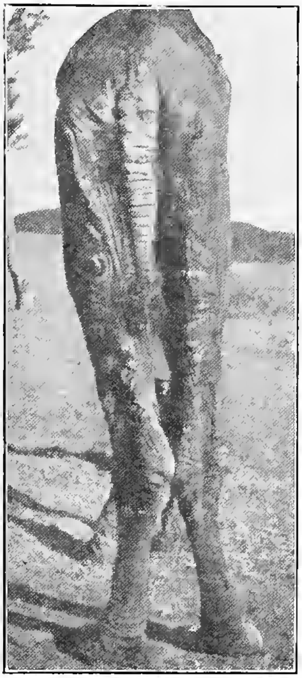

FIG. 121.—SARCOPTIC SCABIES (CAMEL), SHOWING FOLDS AND THICKENING OF SKIN. (Cross, "Diseases of the Camel.")

Calcium Sulphide.—The best means of applying this dressing is by the use of a "dipping bath." The solution must be used warm, and a sunny non-windy day should be selected for the dipping. The solution can be applied to the hump and back by brushes with long handles, and to the head by rubbing with a cloth soaked in the solution; after removal from the bath the camel should be walked about till dry.

Bland Oils mixed with Sulphur.—The dressing is best applied by means of a cloth, and great care is necessary to see that it is applied to every part of the body and that it is well rubbed in; about 2½ pints is usually sufficient for an average-sized camel. It is preferably applied late in the afternoon. The following morning the camel should be smeared all over with mud and sent out to browse. The object of applying the mud is simply to protect the camel from the sun. If the camel is stall fed and can be put in any place where he is not exposed to the sun, the application of the mud is not necessary; but if he is exposed to the sun after being smeared with oil and no mud is applied to afford protection, the skin will become blistered and the camel is put to considerable pain and suffering. The next day the mud and dressing are removed by washing, or, if the day is cold and windy, by rubbing with a blunt-edged stone; after removal of the mud the camel should be thoroughly groomed with a brush with hard bristles.

Taramira Oil (*Eruca sativa.*)—This dressing is a very favourite one for the treatment of mange in camels by the native camel-men in Northern India. It should be applied late in the afternoon, the camel being smeared all over with mud the following morning to avoid the skin becoming blistered by exposure to the sun. The following day the mud and dressing can be removed by washing and grooming. Two pounds are sufficient for one dressing for an average-sized camel.

Sulphurous Acid Gas.—The application of this method necessitates the building of a small shed and the erection of apparatus for the manufacture of SO_2 and the boiling of water. By means of pipes SO_2 and steam are conveyed into the shed in which the camel has previously been tied down with the head outside; by means of a cloth collar fitted round the neck the escape of SO_2 and steam is prevented, but as the head of the camel is outside the shed, he is not inconvenienced by the gas. Care has to be taken that the temperature of the shed does not rise too high; the time each camel has to be exposed to the gas is about one hour. Major Lawrie, late R.A.V.C., claims good results in the treatment of mange in camels by this method, but many people hold the view that successful results are not obtained with it. Sir Layton Blenkinsop recommends the following treatment for sarcoptic mange in camels (*vide* Hoare's "Veterinary Therapeutics"). The camel should be clipped, and if possible should be washed with soap and water. When dry the following dressing is to be applied:

Train oil	2 lbs.
Sulphur	½ lb.
Common salt	½ ,,

Sufficient to dress one camel.

This should be removed on the third day, either with warm water or soap, or applying paraffin emulsion and washing with soap and water on the fourth day. Three successive dressings usually effect a cure. When near the sea, mange in camels has been successfully treated by making the animals lie down in the sea water and rubbing them with coral. Three or four baths usually proved effective, but it is always advisable to dress the animals at least once with oil and sulphur before discharging them as cured.

In the writer's experience, watery dressings in the treatment of camel mange compare very unfavourably with oily dressings. In his opinion, the most satisfactory results are obtained by the application of taramira oil (*Eruca sativa*), of which 2 pounds are usually sufficient to dress an average-sized camel. When thoroughly and carefully applied, three dressings are sufficient to cure the most obstinate cases of mange. It has, however, certain disadvantages, its application causing—

1. A rise in temperature.
2. The camel may " go slightly off feed " for a day, and in greatly debilitated camels it has been known to cause death when applied during the winter months; but in average condition camels, even in the cold weather, if the camels are properly looked after its use is perfectly safe.—*H. E. Cross*.

Notœdric Mange of the Cat.—This skin affection is still often called sarcoptic or head mange. It is the only important skin disease of the cat due to acari.

Treatment.—Home treatment is usually unsatisfactory. It is best to place the animal on the operating table and remove as much hair as possible from the diseased area. Rather than soak the scales in soft soap and remove by water and friction, a quantity of vaseline can be well incorporated into the part. In a couple of hours a cloth, with or without some dry bran, will remove a large amount of the accumulated scab. The dressing most suitable for the cat is that of Helmerich (p. 389). It should be repeated at intervals of four or five days until irritation and scab formation cease. Before a second dressing is applied, as much scurf as possible should be removed in the manner described above. In some cases it may be advisable to cut the nails and dress the feet slightly.

Prophylaxis and Prevention.—The disease is chiefly spread by strays and during nocturnal perambulations, so that the destruction of homeless affected animals, together with early castration of males and spaying of females, in addition to disinfection methods, are the chief factors to be observed in the control of the disease.

Notœdric Mange of the Rabbit is the common form encountered, and differs little in its therapeutic and prophylactic aspects from the same disease in the cat.

Cnemidocoptic Scabies.

(*a*) **Scaly Leg of Poultry.**—At the present time scaly leg is quite common, although it is slow in its course and spread. It affects the legs of the fowl, pheasant, turkey, and guinea-fowl.

Treatment.—The scabs are best removed by applying soft soap with a brush after soaking the legs in hot water. A weak solution of caustic potash may also be used—viz., liquor potassæ. Care must be taken not to injure the skin or remove true scales. Suitable dressings are: (1) Helmerich's ointment; (2) creosote 1 part, lard 20 parts; (3) sulphur and lard, equal parts; (4) carbolic acid 1 part, lard 20 parts. The milder preparations should be used on young birds. After a few days the dressing can be washed off, together with loosened scales, and then repeated until a cure is effected. Whilst under treatment, birds should be kept on a clean run and away from exercising pens or dusting baths.

Prophylactic and preventive measures must follow general lines, with special attention to perches, resting and nesting places.

(*b*) **Depluming Scabies.**—In this country fowls and pigeons occasionally become infested with the depluming mite. It often starts on the rump, near the insertion of the tail feathers. It thus happens that poultry-keepers often regard the condition as due to "overtreading." Later, as the feathers fall or are plucked out by the irritated bird, "feather-picking" is regarded as the cause instead of a symptom. It would appear that the cock is an important propagator of the disease. When a number of birds are affected, creolin or lime and sulphur dip spraying can be carried out weekly. The birds can be held up by the legs with the head downwards and protected by the hand, whilst an assistant sprays them by means of a watering-pot with a rose. Often, if the affected areas are moistened with soapy water, sulphur can be dusted on the parts. In slight cases creosote 1 part in 20 parts of vaseline can be smeared on and around the denuded patches. The feet of cocks deserve attention, and the males can be removed from non-affected hens. The control of the disease is otherwise similar to scaly leg.

Psoroptic Mange.

Scabies due to *Psoroptes* is important in the horse and sheep. In this country it is a scheduled disease in both of these animals. Abroad it sometimes constitutes a serious enzoötic in cattle. In the goat and rabbit it takes the form of an otoacariasis. On account of the superficial habitat of the mite the disease is more readily amenable to therapeutic measures than sarcoptic scabies.

Psoroptic Mange of the Horse.—Less common than formerly, due no doubt to veterinary sanitary-police measures, the law recognizes the more benign nature of this disease, when compared with the sarcoptic form, by allowing animals under treatment to be worked.

Treatment.—The principles of treatment are similar to those of sarcoptic scabies, save that they need not be so energetic. It is essential that the whole body be clipped; that the whole surface be washed, and any scab carefully removed; and that the dressing be applied over the whole surface of the body. After a period "in dressing," thorough washing is again followed by a second dressing at an interval of seven to ten days from the first one. The lime and sulphur dip given for sheep scab does well, save that it makes the coat a little harsh. The horse-fat calcium polysulphide mixture mentioned under Equine Sarcoptic Mange is excellent, and so is the oil and sulphur mixture. If a tobacco dip is used, it should not contain more than 0·07 percent. of nicotine; but with tobacco, whose composition varies, this is difficult to ascertain, and to be safe nicotine itself can be used or a fourth of the body dressed at a time with a 5 per cent. decoction of tobacco. The usual errors in treatment are too irritant dressings, too often applied, with incomplete washing. The result may thus be a dermatitis worse than the disease itself. Particular attention must be paid to the mane, tail, and under parts of the body. Occasional spraying of apparently cured animals completes the treatment and prevents recurrences. Practically speaking, any of the dips and procedures recommended for sheep scab can be used upon horses.

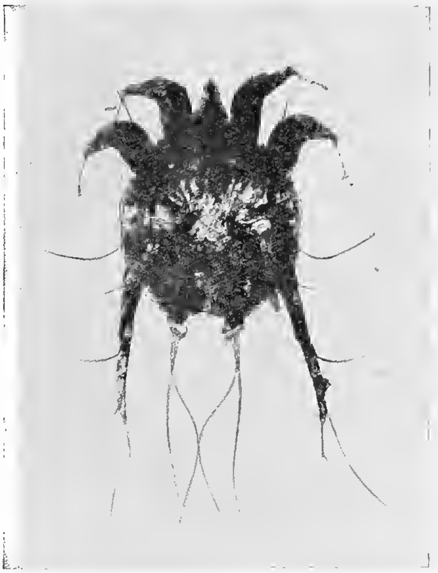

FIG. 122.—PSOROPTES EQUI (×70): MALE. The fourth pair of legs is indistinct. (From Pillers' "Mange and Allied Mites.")

Prophylaxis and prevention does not differ in any material aspects from that already described for sarcoptic mange of the horse; emphasis must, however, be laid upon the value of clipping and good grooming.

Psoroptic Scabies of Sheep (Sheep Scab).—Sheep scab is still an important disease in this country, and many *minutiæ* could be gone into concerning its spread in a detailed work on this disease alone.

Treatment.—Double dipping, with an interval of seven to twelve days, of affected and in-contacts in a reliable non-toxic dip is now recognized as the correct method of controlling the disease. Spraying, salving, and pouring are ineffective, and have been the cause of spreading it. Home-made and proprietary dips have to be approved of by the Ministry of Agriculture. A satisfactory dip should be non-toxic to animals and men, should not damage the fleece or skin, should not cause " set-back," should be easily prepared, should be as fool-proof as possible, and, finally, should kill the parasite. Where possible, shearing should be carried out a fortnight before dipping. Care must be exercised with rams and pregnant ewes. A warm dip is better than a cold one; after dipping the animals should drain on a bare lot, and then be placed on a non-infected run. The following are three dips which have the approval of the Ministry of Agriculture and Fisheries. They are for 100 gallons of solution.

" (a) *Lime and Sulphur.*—Mix 25 pounds of flowers of sulphur with 12½ pounds of good quicklime. Triturate the mixture with water until a smooth cream, without lumps, is obtained. Transfer this to a boiler capable of boiling 20 gallons, bring the volume of the cream to 20 gallons by the addition of water, boil and stir during half an hour. The liquid should now be of a dark colour; if yellowish, continue boiling until the dark red colour is obtained, keeping the volume at 20 gallons. After the liquid has cooled, decant it from any small quantity of insoluble residue and make up the volume to 100 gallons with water.

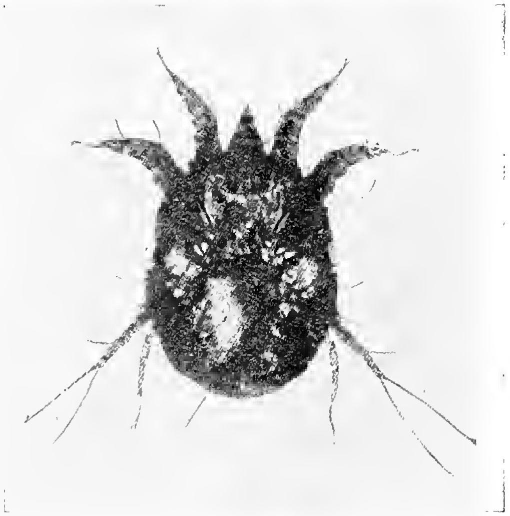

FIG. 123.—PSOROPTES EQUI (× 50): OVIGEROUS FEMALE.
(From Pillers' " Mange and Allied Mites.")

" (b) *Carbolic Acid and Soft Soap.*—Dissolve 5 pounds of good soft soap with gentle warming in 3 quarts of liquid carbolic acid (containing not less than 97 per cent. of real tar acid). Mix the liquid with enough water to make 100 gallons.

" (*c*) *Tobacco and Sulphur.*—Steep 35 pounds of finely-ground tobacco (offal tobacco) in 21 gallons of water for four days. Strain off the liquid and remove the last portions of the extract by pressing the residual tobacco. Mix the whole extract and boil; add 10 pounds of flowers of sulphur. Stir the mixture well to secure an even admixture, and make up the total bulk to 100 gallons with water.

" The period of immersion in these dips should not be less than half a minute."

All quantities in connection with the preparation of dips must be measured.

Dipping plants vary in size and completeness from a simple hand tub of sufficient size to immerse a sheep up to elaborate steam-heated plants. In the colonies and with large armies in the field an extensive literature has grown up on the management of such plants where cattle and horses have to be dipped for the control of tick-borne diseases. The commonest type for sheep is the swim-bath, and in this country it is set in the ground and fenced by hurdles. It may be 33 feet long at the top, 20 feet 6 inches long at the bottom, with the entrance end a vertical drop of 3 feet 6 inches to 5 feet. The exit end is therefore sloping, and is furnished with foot-holds. The slides slope inwards, the width at the top being about 2 feet 3 inches, and at the bottom 9 inches.

Prophylaxis and Prevention.—Apart from the differences in management, the control of scab should follow the usual lines. Markets, dealers' premises, cattle trucks, and the difficulties of controlling animals on hill-runs are some of the commonest loopholes for infection spreading. The disinfection of rubbing places deserves attention. Routine dipping after shearing is not only a safeguard against scab, but prevents the multiplication of other arthropods of the sheep's skin.

Psoroptic Scabies of the Ox.—Where odd cases of this disease occur, the isolation of the affected and spraying with the lime and sulphur preparation given under Sheep Scab at intervals of ten days are indicated. The in-contacts should be similarly treated, and sheds, etc., disinfected. Abroad, when the disease assumes an enzoötic nature, double dipping for two minutes, with ten days' interval, in a cattle swim-bath is the treatment resorted to.

Psoroptic Otacariasis of the Goat.—In addition to the usual preventive measures, the actual treatment consists of cleaning out all the parasites and detritus which have accumulated in the depths of the auditory meatus. This can be effected with forceps and cotton-wool. As a dressing, benzene in an equal amount of a bland oil or sulphur ointment should be applied weekly for a few times.

Psoroptic Otacariasis of the Rabbit.—This is a comparatively common condition in hutched rabbits, and, when found, should lead to an examination of all the in-contacts. Hutches containing affected animals will require disinfection. After removing and carefully destroying, as far as possible, parasites and accumulated material from inside the ear-flap with cotton-wool and forceps, the abraided surfaces should be protected by a little bland oil. The applications mentioned for the goat can be used, but better results are obtained by three dressings during a fortnight with the following dressing recommended by Andrée:

℞	Tincturæ Opii	1 part.
	Oleum Tereb.	1 „
	Acidi Carbolici Liquoris	2 parts.
	Glycerini	100 „

M. Ft. lini.

In very neglected cases the internal ear may be damaged, and occasionally the parasites invade the skin of the head.

Chorioptic Mange of the Horse.

Although *Chorioptes sp.* infest a number of animals, the disease is only of major importance in the horse; in the others, when it occurs on the body, the treatment is similar to the psoroptic form and to that given for the horse when the extremities are the seat of the lesions. In the horse the disease is commonly confined to the extremities, being rarely found above the elbows in the front limbs, and stifles in the hind ones, which are more often attacked than the fore. The parasites are found on the surface of the skin. Their importance is not so much in the actual lesion they produce as in the secondary conditions which they induce or are indirectly responsible for. Clean-legged animals are comparatively rarely attacked when contrasted with the hairy-legged breeds. Here the irritation they set up may be the precursor of grease and thickened legs. In stamping, injuries may result from a displaced shoe, the coronary band may be bruised, and then give rise to quittor. In attempting to bite the hind legs, horses may fall or become cast, with serious results. Affected animals are often difficult to shoe, and may injure the smith. The hairy leg and improper attention are no doubt important predisposing factors to infection.

Treatment.—Although clipping of the hair of the legs considerably aids treatment, it must often be sacrificed. Very thorough washing in soap and creolinated water will remove great numbers of parasites and scales. After drying, a well-mixed warm emulsion of soap (1 lb.), water (1 gallon), and paraffin (1 pint) is a suitable dressing. A couple

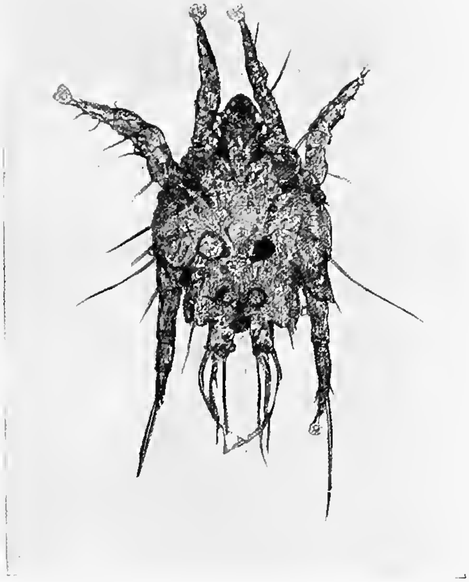

FIG. 124.—CHORIOPTES EQUI (×120): MALE, VENTRAL ASPECT.
The fourth pair of legs and their suckers are indistinct, and the sucker of one third leg is not visible. (From Pillers' "Mange and Allied Mites.")

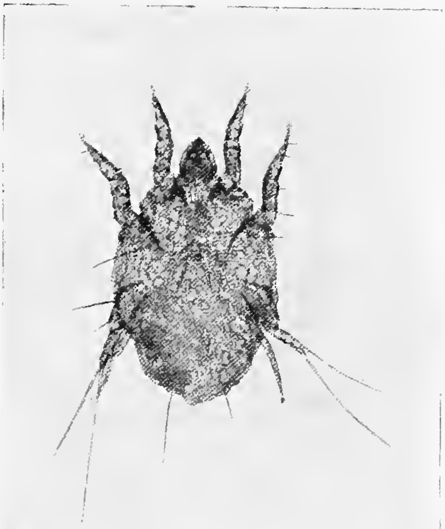

FIG. 125.—CHORIOPTES EQUI (×90): OVIGEROUS FEMALE, VENTRAL ASPECT.

of hours after the application of this preparation, plenty of sawdust should be rubbed into the legs. Three such courses of treatment during consecutive week-end rests will usually effect a cure. Failure most often results from not keeping the emulsion warm so that it does not spread on the skin, and from missing some affected areas. Starting at the coronets, the hair should be parted every few inches, and the emulsion applied until the whole limb has been dressed; especial care should be paid to the area below the ergot. Even when only the hind limbs appear to be affected, the fore ones should also be treated. The usual sanitary measures are advisable, although the disease is slow to spread. Many applications, in addition to the one mentioned above, can be employed, such as milk-white solutions of creolin preparations and sulphur in oil. Soaking the legs in a tub of dressing is not in itself sufficient unless efforts are made to thoroughly cover the skin of the whole limb.

Otodectic Mange (Parasitic Otorrhœa, Parasitic Canker).

Otodectes sp. cause an otorrhœa in the dog, cat, and ferret. The clinical aspects of the disease are somewhat similar in each of these animals. Slight irritation leads to scratching of the flap, with the formation of an external sore; violent shaking may cause the appearance of a hæmatoma, with consequent "crenated flap" or "cauliflower ear." In advanced cases there may be damage to the ear proper, with disturbances in equilibrium, and an abnormal carriage of the head. After carefully cleaning out the accumulated material, boracic acid ointment to which 30 minims of carbolic acid per ounce has been added forms a suitable treatment. One part of tincture of iodine to 10 parts of glycerine is also a very satisfactory biweekly dressing. In some cases damage to the ear-flaps can be prevented by a tubular bandage with drawing-strings at both ends.

Polyinfections of Scabies.

In many cases more than one type of mange may exist on the same animal. Thus, psoroptic and chorioptic or sarcoptic and chorioptic may occur on the same horse. Both species of common lice may co-exist with mange. It is well to bear these points in mind, and to adopt a course of action which has the whole of the animal and the most troublesome condition in view.

Accidental Infestations with Mites.

In addition to the acari responsible for scabies, a number of allied mites of a normally free-living habitat have been found upon the skin of animals. The most important of these belong to the genera *Aleurobius*, *Tyroglyphus*, *Glyciphagus*, and *Cheyletus*. The pabulum of a number of them is the dust of hay, forage, and bedding, so that control is difficult. When it is thought that pruritus is due to them, a dressing or two with an oily base, such as the calcium polysulphide horse-fat preparation mentioned on p. 388, should prove useful.

Acariasis due to Trombidium.—In autumn many species of animals, but especially dogs, may be attacked when in the region of stubble with immature forms of *Trombidium*, or harvest bugs. The irritation is at first excessive, but gradually passes off, and it is usually sufficient to apply emollient unguenta such as those of boracic acid, sulphur, or salicylic acid. It is stated that military horses on autumn manœuvres and race-horses in training are sometimes attacked, and eruptions result on the skin up to the knees and hocks. In such cases the causal mite is termed the "heel bug." Dressings of weak coal-tar solutions and weak paraffin emulsions in soap solutions (1 in 20) are said to act as deterrents to infestation if applied just before exposure.

Red Mites.—Poultry and pigeons are very liable to the attacks of *Dermanyssus gallinæ*, a mite which hides in cracks and nests during the day, but becomes active at night. It may even attack horses. Hens may refuse to sit, and young pigeons may be deserted. The mites suck blood. A thorough overhauling of the premises in the daytime with boiling water, disinfectant, and hot lime-wash, together with the provision of clean nests or nesting-pans with antiseptic powder in them, will usually check the severity of their attacks.

Infestations by Ticks.

Nearly all the domesticated animals and birds are liable to the attacks of different species of ticks. The chief genera are *Argas*, *Ornithodorus*, *Ixodes*, *Hæmaphysalis*, *Dermacentor*, *Rhipicentor*, *Rhipicephalus*, *Margaropus*, *Boophilus*, *Hyalomma*, and *Amblyomma*. There are a great number of species included in these genera, and abroad they are extremely important. Thus no less than about thirty species may be found on the horse, forty on the ox, twenty-one on the sheep, nine on the goat, four on the pig, twenty-six on the dog, and eleven on the cat. In this country *Argas reflexus* on birds and *Ixodes ricinus*, *I. hexagonus*, and *Hæmaphysalis punctata* are the most important species. *Argas* is nocturnal, and by its nightly blood-sucking attacks on pigeons and poultry may disturb adults and kill young ones. In America, the spinose ear tick (*Ornithodorus megnini*, *Otobius megnini*) causes much irritation in cattle by its attachment to the conchal cartilage; shaking of the head, excitement, and deafness are then often seen.

The site of attachment of a tick may become infected, and result in a serious local inflammation such as suppurative orchitis. The amount of blood taken up by a heavy infestation of ticks may in some cases prove a serious menace to the health of the host. The most important rôle of ticks, however, lies in their power to transmit protozoan diseases. Only recently has it been shown that surra can be spread by means of an *Ornithodorus*. The following table shows the vectors of some of the protozoa of the blood:

Parasite.	*Disease.*	*Vector.*
Nuttallia equi	Equine malaria, equine piroplasmosis	*R. evertsi, D. reticulatus*
B. bovis	Texas fever, redwater	*I. ricinus, I. hexagonus*
B. divergens	Bovine piroplasmosis	*H. punctata, R. evertsi, R. capensis, R. appendiculatus, B. decoloratus, B. annulatus, B. dugesi*
B. ovis	Ovine piroplasmosis	*R. bursa*
B. canis	Malignant jaundice, canine piroplasmosis	*I. ricinus, I. hexagonus, H. leachi, D. reticulatus, R. sanguineus*
Theileria parva	East Coast fever, Rhodesian redwater	*R. evertsi, R. simus, R. appendiculatus, R. capensis, R. nitens*
T. mutans	Gall sickness	*R. evertsi, R. appendiculatus*
Anaplasma marginale	,,	*B. decoloratus*
Spirochæta theileri	,,	,,
Leishmania canis	Leishmaniasis	*R. sanguineus*
Trypanosoma evansi	Surra	*O. crossi*

R. = *Rhipicephalus* ; *D.* = *Dermacentor* ; *I.* = *Ixodes* ; *H.* = *Hæmaphysalis* ; *B.* = *Boophilus* ; *O.* = *Ornithodorus*.

Treatment.—In the dog an odd tick or two can be removed by applying a little chloroform, benzine, or turpentine to them, or even a hot spatula, and then pulling them off. Hand-dressing with a bland oil, 2 or 3 parts, in which 1 part of kerosene has been added, will allow numbers to be removed with the hands. Even if the mouth parts are left in the skin, they are not so important as the whole tick. Predilection seats are behind the ears, the root of the tail, the axillæ, and the inguinal region. Dipping in arsenic dips of varying strengths according to the interval between dipping is the best method of attacking widespread infestations.

Control.—On the control of ticks in some of our colonies the live-stock industry depends, for many of the great mortality-producing diseases are spread by them. The subject can thus only be lightly touched upon here. Where dipping is used, the life history of the tick, its duration on the host in its different stages, and whether it drops off, all influence the period between immersions. When this is short, the resistance of the animal to the toxic effects of the dip has also to be taken into consideration. Watkins Pitchford showed that dipping cattle every fourth or fifth day in—

Sodii Arsenitæ	8½ lbs.
Saponis Mollis	5½ ,,
Oleum Paraffini..	2 gals.
Aquæ	400 ,,

would control East Coast fever.

In this country anti-tick measures have not been necessary. Dipping at fifteen-day intervals has a marked effect in the reduction and the prevalence of one-host ticks.

Ticks can be controlled by starving them out, and not allowing suitable hosts to gain access to infested land.

A rotation of crops or cultivation, where possible, can be used with the same end in view. Grass and scrub can be burnt with a view to clearing, but it is not easy to carry out satisfactorily.

If non-susceptible animals are turned on to a "redwater" field, the ticks will in time become "clean" or incapable of conveying the disease to cattle. This takes about fifteen months. Apart from the eradication of ticks themselves, it may not always be desirable to do so from the point of view of the protozoan disease, and in some instances wild animals which also harbour ticks may be very difficult to control.

The prevention of the ravages of *Argas* among pigeons and poultry is brought about by abolishing cracks and crevices, with thorough cleanliness, scalding out the pens with boiling water, and then lime-washing.

INSECTA.

Lousiness (Pediculosis, Phthiriasis).

The terms in parenthesis are derived from the generic names of the lice of man—viz., *Pediculus* and *Phthirius*—and should, strictly speaking, not be used for the lower animals. Lice possess an incomplete metamorphosis, and after a few days the egg hatches into young, which closely resemble the adult. The life cycle takes place upon the host. *Hæmatopinus* and *Linognathus* suck blood, whilst *Trichodectes* and the genera inhabitating the plumage of birds live upon epidermal scales, hairs, feathers, and other skin products.

Trichodectes sphœrocephalus is the only common louse of the sheep. The trichodects of the dog and cat are important, as they may harbour the cystic stages of tapeworms belonging to the genus *Dipylidium.*

Treatment.—The actual measures to be adopted depend upon the number of parasites present and the season of the year. There are a great number of satisfactory insecticides, a few of which can only be mentioned.

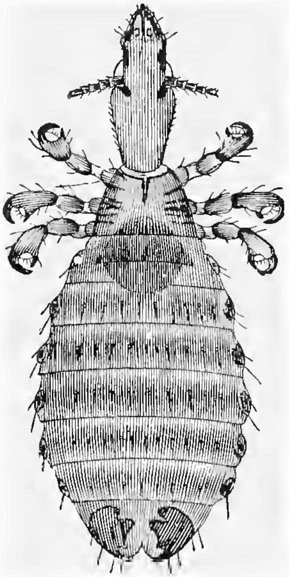

Fig. 126.—Hæmatopinus macrocephalus, Female, of the Horse (× 20). (Railliet.)

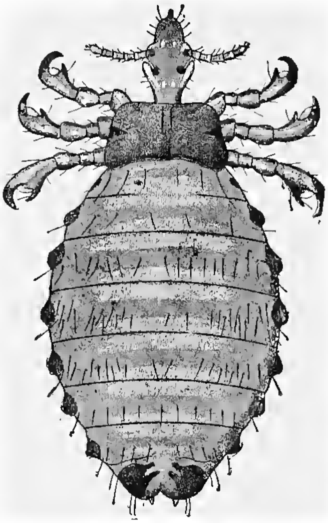

Fig. 127.—Hæmatopinus eurysternus, Female, of the Ox (× 20). (From Neumann's "Parasites.")

Host.	*Lice.*
Horse	*Hœmatopinus macrocephalus, Trichodectes pilosus, T. parumpilosus.*
Ox	*Hœmatopinus eurysternus, Linognathus vituli, Trichodectes scalaris.*
Sheep	*Linognathus pedalis, L. ovillus, Trichodectes sphœrocephalus*
Goat	*Linognathus stenopsis, Trichodectes climax.*
Pig	*Hœmatopinus urius.*
Dog	*Linognathus piliferus, Trichodectes latus.*
Cat	*Trichodectes subrostratus.*
Rabbit	*Hœmodypsus ventricosus.*
Fowl	*Goniodes dissimilis, Gonicotes gallinœ (G. hologaster), G. gigas, Lipeurus variabilis, L. heterographus, Menopon biseriatum, M. pallidum.*
Turkey	*Goniodes stylifer, Lipeurus meleagridis, Menopon biseriatum.*
Duck and goose	*Philopterus icterodes, Lipeurus anatus, Trinotum luridum, T. lituratum.*
Pigeon	*Gonicotes compar, Goniodes domicornis, Lipeurus baculus.*

Sheep will have to be submitted to routine dipping, preferably in a dip containing tobacco. It has been previously pointed out that **goats** take to dipping badly, and they must therefore be well sprayed.

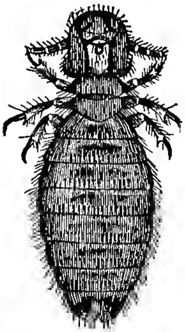

Fig. 128.—Tricodectes pilosus, Female, from the Horse (× 20).
(Railliet.)

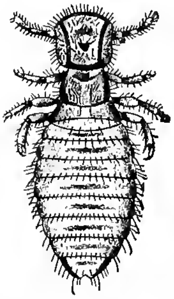

Fig. 129.—Trichodectes sphærocephalus, Female, of the Sheep (× 20).
(From Neumann's "Parasites.")

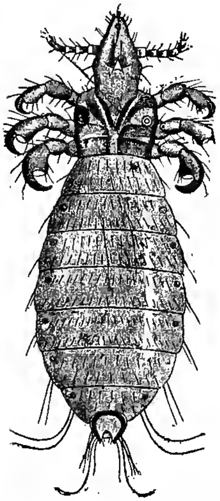

Fig. 130.—Linognathus vituli, Female, of the Ox (× 20).
(From Neumann's "Parasites.")

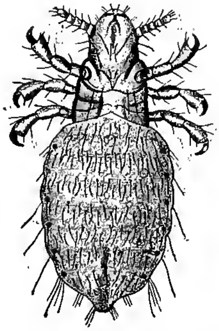

Fig. 131.—Linognathus piliferus, Male, of the Dog (× 20).
(From Neumann's "Parasites.")

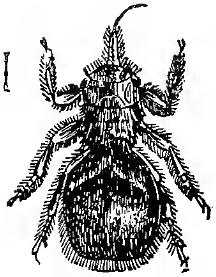

Fig. 132.—Melophagus of the Sheep. (Magnified.)
The line on the left indicates natural length.
(From Neumann's "Parasites.")

Cattle will require spraying in a somewhat similar preparation. A decoction of tobacco, 4 ounces to the gallon of water, also makes a suitable wash for them.

Swine can be treated all over with a creolin wash (5 per cent.) and a mixture of equal parts of whale oil, sulphur, and paraffin applied to the predilection seats—viz., around the ears, axillæ, and inside the thighs. With widespread infestations a creolin dip may have to be used when the weather is suitable.

In **dogs** with suitable coats, after thorough brushing, weekly combing with a fine-toothed comb will gradually reduce the number of lice present. This can then be followed by dredging on to the skin at biweekly intervals powdered naphthalene. A similar course is suitable for the **cat,** where pyrethrum can also be employed. In heavily infested dog cases, where trichodect eggs appear as numerous, if not more so, than the hairs, complete clipping is necessary. After this the animal should be washed in a liquid spirit soap containing a small amount of eucalyptus oil. Thorough grooming and combing should then be employed. Creolin in 2 per cent. solution is satisfactory as a weekly wash.

On the **horse** the trichodect generally appears after a run at grass; clipping, thorough grooming, and a good wash after soft soaping affected areas will usually bring about a satisfactory result. Blood-sucking lice are, on the other hand, much more difficult to remove completely. After close clipping vast numbers of eggs or nits can be removed by carefully scraping heavily infested parts with a thin table knife. Singeing may also prove very useful. A decoction of tobacco (4 ounces to the gallon) is very effective. It is best to apply it to half the body at a time. Usually three dressings at intervals of a week, together with strict attention to the hygiene of the skin, will suffice. The hairy legs of shires are important breeding grounds of the large-headed louse, and if neglected reinfestation of the body takes place. As the hair cannot very well be removed, particular attention must be paid to see that the decoction reaches the skin everywhere. For the legs, the detailed treatment with paraffin soap solution, as given for equine chorioptic mange on p. 396, should be followed. As a **general** recommendation it may be mentioned that decoctions of tobacco and solutions of perchloride of mercury are very powerful against lice, but their toxicity for the different hosts has to be borne in mind, and only such amounts used and such areas treated as are well within the limits of safety. Acetic acid, about 5 ounces to the quart of water, has a destructive action upon lice eggs, and can be used as a second dressing for this purpose, or the same proportion can be mixed with the primary dressing providing no chemical changes are likely to ensue.

For **poultry**, the getting rid of lice is not so much a question of treatment as a campaign. In America, sodium fluoride is extensively used as a powder, about ten pinches being scattered throughout the feathers over the whole body. As it is somewhat irritating to the nasal mucous membrane, a protector should be worn by the operator. Sodium fluoride can also be used in fine warm weather as a dip (1 ounce to the gallon of warm water). Pyrethrum can be dusted on to the skin, but this should be previously moistened with strong soap solution.

Prevention and Control.—In the larger animals, when hair is removed it should be done in an isolated shed and the clippings burned. The same measures as have been described for the manges will be necessary with regard to bedding, habitations, grooming tools, clothing, and harness. In the case of swine, wallows should be sprayed with creolin solutions of a strength which do not damage the skin of pigs. New animals should always be carefully examined. Up-to-date hygiene and modern management are the surest ways of keeping lice in check. With some of the smaller mammals and birds, whose habitations are not of so permanent a character, attempts can be made at constructing louse-proof buildings by employing concrete, galvanized sheets, and abolishing cracks and crevices. Nesting-places and sitting hens require treatment. Dust baths for poultry consist of (1) Macadam road dust; (2) Macadam road dust with one-fifth its weight of tobacco dust; (3) fine ashes; (4) fine ashes with one-fifth their weight of powdered sulphur; and (5) equal parts of Macadam road dust and lime, with a small amount of sulphur.

Bugs.

Bugs are only important in poultry and pigeons, *Cimex lectularia* attacking the former, and *C. columbara* the latter. They feed at night, and their control is somewhat similar to the measures indicated for the mites and lice of poultry. Often, however, they are extremely difficult to completely eradicate.

Fleas.

Ctenocephalus canis of the dog, *C. felis* of the cat, *Pulex irritans* of both, *Spilopsyllus cuniculi* of the rabbit, *Ceratophyllus gallinæ* of the fowl, and *C. columbæ* of the pigeon, are the species most important to the veterinarian. Being temporary parasites, a proper hygiene of the skin should keep them in check upon the body. In the dog, grooming, combing, and regular washing with a spirit soap in which there is an essential oil, are to be recommended. In the cat, the usual powders can be used. Affected animals often have the black fæces of the flea along the region of the spine. Cats with neglected skins may have eggs, larvæ, and pupæ upon them as well as the adults. As the life history is completed in cracks and crevices of the host's habitation and bedding, thorough measures against infested material should be carried out. This may include burning the bedding in the kennel, splashing with scalding water, disinfection, and lime-washing (especially the cracks between floor boards). Bedding material should contain some agent which is not obnoxious to the host, such as pine sawdust or shavings. Old rugs, carpets, and sacks are unsuitable. The fact that the life cycle of *Dipylidium sp.* is completed through fleas has already been mentioned.

Jiggers.

In certain hot countries all the domesticated animals are liable to the attacks of *Dermatophilus penetrans*—the jigger. Birds suffer from *D. gallinacœ.* After fertilization the female bores into the skin, chiefly of the extremities, and here they cause great irritation and pain, leading often to serious complications. The last couple of segments of the abdomen are visible as a black speck. The treatment generally recommended is carefully to remove them and apply an ointment of 1 per cent. carbolic acid. It is difficult to protect wandering animals from their attacks. Habitations, where possible, can be kept swilled with coal-tar disinfectants. Animals pick up infection from dry sand and other places, and carry the parasites into human dwellings.

Insect Stings.

Stings from insects are not common in the lower animals. Occasionally, however, when sheltering under trees, cattle and horses may be stung by bees, wasps, and hornets. Sometimes, when swarming, they may alight upon animals. Pigs may disturb wasps from decaying fruit, and so be attacked. They may give evidence of the event by squealing. Dogs often dig up some ground-nesting species, with untoward results. Cold applications and antacid solutions, such as weak ammonia and bicarbonate of soda, are indicated for stings. Refrigerants are sometimes used. In extreme cases cardiac stimulants, and even tracheotomy, may be necessary. The attacks of ants may be similarly combated.

Bots.

Several species of *Gastrophilus* larvæ may be found throughout the alimentary canal of equines. The eggs of *G. equi*, the commonest British species, are deposited around the knees, but they may also be found on other parts. The larvæ attach themselves to the mucous membrane of the stomach. *G. hœmorrhoidalis* lays its eggs near the lips, and the larvæ may be mixed with those of the former species. On their way to the exterior they often attach themselves to the rectal mucous membrane. *G. nasalis* lays its eggs on the wings of the nostril, and the larvæ are found in the pyloric portion of the duodenum; apparently they do not come to rest in the rectum. *G. pecorum* is common in some countries. Apart from their usual seats in the alimentary canal, bots have been found in the hinder reaches of the upper air passages.

Treatment.—In this country, from May onwards for a couple of months, horses may be seen to pass bots in their fæces. It is then that attention is drawn to them and medical treatment is demanded. Owing to this normal expulsion, satisfactory results have been claimed for numerous drugs; a number of them are, however, unreliable, and the best results are obtained by giving carbon bisulphide in capsules. Great care is necessary not to expose the mucous membrane to it. For absolute safety the stomach tube is preferable. The stomach should be completely empty, but a little water can be given at the end of the fast. Hall and Avery found that 6 drams in one dose, or two doses of 4 drams each given at an interval of two hours, would remove all the bots from the stomach and duodenum. Three doses of 3 drams each at intervals of one hour were equally as effective. If a purgative is given, it should be either several hours before or after the drug. Linseed oil lessens the efficacy of carbon bisulphide.

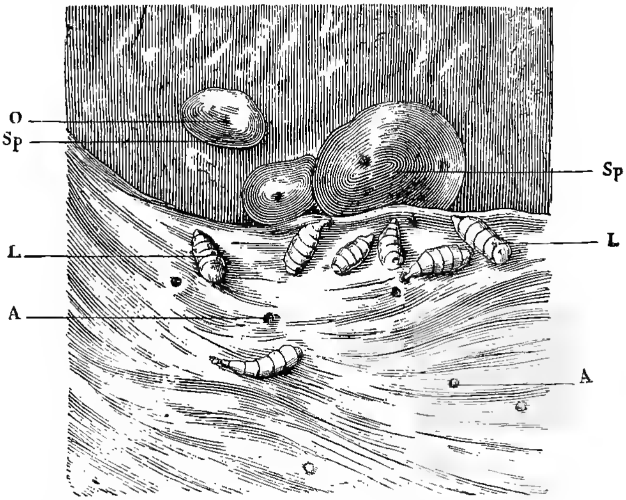

FIG. 133.—HABRONEMA AND LARVÆ OF THE GASTROPHILUS IN THE STOMACH OF THE HORSE.

Sp, Tumours of the *Habronema megastoma* developed in right sac; *O,* orifices of those tumours; *L,* larvæ of the *Gastrophilus equi* fixed to the mucous membrane; *A,* alveoli of insertion of the larvæ of the *Gastrophilus hæmorrhoidalis* which have left the stomach (one-half natural size).

(From Neumann's "Parasites.")

Control.—No serious attempts have been taken to prevent bot infestation, because little importance is attached to them. Several reports appeared in 1919 with reference to the widespread prevalence of *G. equi*. The eggs are most often deposited when animals are at grass during August and September. Young stock, brood mares, and horses at summer grass are therefore most likely to become infested. Farm horses at work, however, often get the eggs on them. The female flies may follow horses into fairly large market towns. In the case of animals under daily inspection, the eggs can be removed with a cloth soaked in vinegar, or the singeing lamp may be used. In some cases, an old table knife will scrape them off. During the war, where bot-fly eggs were very common, certain non-commissioned officers were very keen on keeping down bots when going round their charges daily; old socks were sometimes used to singe with, when nothing else was available.

In fields, suitable shelters or wading-places will prevent ovipositing, and the parts where eggs are likely to be deposited may be smeared with a mixture of tar, sulphur, and grease. The long tail and movements of the skin will keep the flies away from most of the situations likely to be used by the females when in great haste to lay. The destruction of the larvæ and adult females naturally reduces the crop of eggs.

Warbles.

Warbles are the final stage, before leaving the skin of the host, of certain œstrid flies, notably *Hypoderma*. In this country, *H. bovis* of cattle is by far the commonest species. *H. lineata* also affects bovines and *H. silenus* horses. In many hot countries *Dermatobia noxialis* is a very important species. Although the horse warble is comparatively rare, treatment by the veterinary surgeon is more often resorted to than in cattle, on account of the swelling being in such a position as to cause sore back; in cattle, although often very numerous, little is done either in

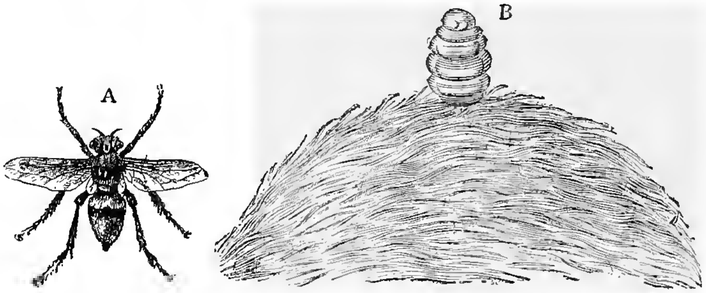

FIG. 134.—HYPODERMA BOVIS. (Réaumur.)
A, Female, natural size; *B*, larva making its exit from a tumour.

treatment or prevention. The swellings begin to appear on the backs of cattle from January onwards, and the larvæ make their exit during the following months. The flies are on the wing from May until September.

Treatment.—After slightly enlarging the hole which the grub makes in the skin, removal is easily effected by pressure or forceps. Antiseptic treatment by ointments may be necessary when many warbles have been opened and the weather is warm. In any campaign against the disease, it has been established that biweekly inspections should commence early in January, and be continued for the next six months. Whole grubs should be burned. Considerable loss is experienced annually in the form of damaged hides, lessened milk production, and œdematous areas on the backs of carcasses of beef. A febrile condition is stated to follow puncture of the larvæ when *in situ*.

Control.—Shade and suitable gravel wades will prevent oviposition; at this period cattle may be considerably disturbed. *H. bovis* appears to deposit its eggs upon the hinder aspects of the hind quarters. *H. lineata* prefers the extremities. It is stated that monthly spraying from May to September with a tobacco dip will considerably lessen the number of eggs deposited. Grease to which has been added tar, sulphur, or tobacco offal, used as a deterrent, is applied as three broad bands—one across the shoulders, one across the back, and the third on the quarters.

Sheep Nostril Fly (Œstrus ovis).

Medical treatment of grubs in the nasal cavities of the sheep is of a very unsatisfactory nature. In valuable animals, trepanation and the use of long forceps is indicated. Sheep usually stand the operation well.

Only in some instances is it possible to find suitable shade or scrub to prevent the fly from depositing its eggs or larvæ on the nostrils. Tar smearing around the nostrils is most useful for this purpose. Usually, after it has been done once by hand, sheep can be induced to smear themselves when they go to the lick. A salt log should lie on the ground, and have numerous holes bored in it. Each of these should be 2 inches in diameter. The salt is placed in the depth of the hole, and its edges are heavily tarred twice a week during the months of the fly's activity.

Sheep Maggot Fly (Lucilia sericata).

There are many flies which deposit their ova upon living animals, either in wounds, in contaminated hair (grease of horses) or fleece (perineal region of sheep). In this country *L. sericata*, a green-bottle, is the most important. *Cochliomyia macellaria*, the screw-worm fly, and *Phormia regina* are serious pests abroad.

Treatment.—A little chloroform on affected areas kills the maggots; after this the wound can be washed in a coal-tar disinfectant and a small amount of tar applied around the spot to prevent fresh attacks. All maggots should be destroyed.

Control.—Shearing cuts and other wounds should be antiseptically treated and covered with tar. Parts likely to be soiled should be kept trimmed to prevent contamination with urine and fæces. "Spotting" with tar and turpentine may be used as a deterrent; also dips and fly powders containing sulphur and tobacco dust. Animals which have been scouring require frequent trimming. Spraying the crutch with $\frac{1}{5}$ per cent. arsenious oxide dip gives considerable protection in Australia. Where possible shade, with careful inspection night and morning, followed by treatment, will reduce losses considerably. Fly traps can be devised so that eggs are deposited in soiled fleece, and the larvæ upon hatching fall into a receptacle and die. All dead animals should be destroyed, in order to prevent multiplication of the flies.

Myiasis.

Infestation of the mammal with dipterous larvæ is termed myiasis (myiosis). Although it is generally termed internal or external, no hard-and-fast line of demarcation exists. Thus *Œstrus ovis* (p. 415) produces it in the nasal cavities, *Lucilia sericata* (*infra*) causes a cutaneous form, *Hypoderma bovis* (p. 415) is subcutaneous, and *Gastrophilus equi* (p. 407) gastric. In the alimentary canal of the dog and cat may be found maggots derived from meat (*Calliphora vomitoria*, the blue-bottle), and sometimes in dogs also the larvæ of the cheese fly (*Piophilia casei*). The rat-tailed maggot of *Eristalis tenax* has been found in the pig's fæces. In many cases the fæces may become infested after they are voided. In advanced cases of diseases of the feet in cattle, sheep, and horses, in summer, maggots may be found, and also in neglected wounds. In external cases surgical removal is effective, and covering where possible will be protective. For internal myiasis a dose of opening medicine is often sufficient. Supervision of the habits and food should prevent further infection.

Blood-sucking Flies.

The midges, gnats, mosquitoes, cleggs, tsetse, and other flies, which suck the blood of our patients in different parts of the world are extremely numerous. Their control is a matter for the economic entomologist. Their importance to us arises from their attacks upon the skin, and the protozoan and other diseases which they convey. Many of the larger flies are known as brimps, cleggs, dun flies, gad flies, and breeze flies.

When on the wing they may cause animals to stampede, or if horses are in gears they may run away or start kicking. In this country *Hæmatopota*, *Therioplectes*, *Tabanus*, and *Chrysops* are the commonest breeze flies attacking horses. On cattle may be found the small *Lyperosia irritans* and *Hæmatobia stimulans*. In warm stables and byres *Stomoxys calcitrans* is found all the year round. The spider or New Forest fly (*Hippobosca equina*) is well known in some parts. *Melophagus ovinus*, the sheep kedd, a wingless fly common in the depth of the sheep's fleece, is treated by dipping. Unlike most flies it is pupiparous, and the life cycle is completed on the host.

From tropical medicine it is known that the tsetse flies (*Glossina*) and other species transmit numerous animal diseases, as the following table of some of the important ones shows:

Disease.	*Animals Affected.*	*Cause.*	*Vector.*
Plasmodiosis ..	Pigeon	*Plasmodium danilewskyi*	*Culex pipiens*, *C. fatigans*, *Stegomyia calopus*
Hæmoprotiosis	,,	*Hæmoproteus columbæ*	*Lynchia maura*
Surra	Horse, ox, dog, camel, elephant	*Trypanosoma evansi*	*Tabanus sp.*
Nagana ..	Most mammals	*T. brucei*	*Glossina morsitans*, *G. pallidipes*
Mal de Caderas	Horse and dog	*T. equinum*	*Stomoxys calcitrans*, *S. nebulosa*
Gall sickness	Ox	*T. theileri*	*Hippobosca rufipes*, *H. maculosa*
Gambian horse sickness	Horse, ox, sheep, pig, dog	*T. dimorphon*	*Glossina palpalis*
Baleri	Horse, ox, dog	*T. pecaudi*	*G. palpalis*, *G. tachinoides*

Treatment.—The actual bites rarely call for treatment, but when necessary it should follow that adopted for other insect attacks (p. 409).

Protection.—The long mane, tail, and panniculus muscle do much to prevent the attacks of flies. At work, ear-caps with tassels and fly nets covering the body and coming down to the knees and hocks are in common use in Southern climes. In the stable a thin summer cloth will lessen the bites from *Stomoxys*. Branches of walnut, laurel, and other trees may be fastened to different parts of the harness. Dressings applied to the skin are not very satisfactory, but fish oil upon the mare's udder and inside the thighs prevents the attacks of *Therioplectes*.

In the field, shelter, either natural or artificial, and gravel-bottomed wading-places are beneficial. In some instances animals should graze at night, early morning, and evening, and be housed during the day proper. Subduing the light by blueing the windows of stables lessens the number of flies entering them, and at the same time curtails the activity of those therein. Gauze and netting of various kinds can be used for similar purposes.

Control.—Flies can be gassed at night in empty stables by using sulphur on shovels of hot coke, and by means of inflammable formaldehyde blocks. In addition to *Stomoxys calcitrans*, which breeds in slightly damp manure and certain other organic material, the house-fly (*Musca domestica*) has these places for its larval stage, so that damp manger fronts, accumulations under partitions or in corners, are likely breeding grounds for them. Thorough cleanliness in the stable and cowshed, with deep earth covering of the manure heap, will keep down the prevalence of these two flies.

The fact that certain phases of some of the gastric nematodes (*Habronema sp.*) of horses pass through *Musca domestica* and *Stomoxys calcitrans* has already been referred to (p. 359). As has been previously stated, the other aspects of fly control are a matter for the entomologist or tropical veterinarian.—*A. W. Noël Pillers.*

PAROTITIS.

Inflammation of the parotid gland is occasionally met with as an independent condition, but more often as a sequel to influenza and strangles in the horse, actinomycosis and tuberculosis in cattle, and distemper in the dog. When the gland or glands are acutely inflamed, hot fomentations should be applied and belladonna and camphor liniment rubbed in, the patient fed on sloppy foods, and a course of salines prescribed such as sodium sulphate in alterative doses. If there is much fever, a saline aperient followed by salicylate of soda is advised. Under the foregoing treatment the inflammatory condition may subside in the course of six to eight days, or the gland may suppurate, or a chronic parenchymatous inflammation may result. When pus is indicated, evacuation by careful lancing, so that important bloodvessels may not be injured, is essential, and the cavity irrigated daily with a mild antiseptic. When the gland becomes indurated, painting with strong tincture of iodine or applying a biniodide of mercury blister combined with the internal administration of iodide of potassium is recommended.

In cattle, when the disease is actinomycotic in origin, the internal administration of biniodide of mercury or potassium iodide and local blistering may be tried, but surgical removal is, as a rule, the most satisfactory in these cases. (See Actinomycosis.) Similar observations apply to tuberculosis.

PATELLA, LUXATION OF. *See also* Dislocations.

Luxation of the patella is sometimes seen in rapidly growing and underfed young horses. It is also occasionally observed in matured horses, the dislocation (usually detected on reaching the stable in the morning) being due to the animal, after rising, stretching himself and thrusting his hind leg backwards, thereby almost obliterating the angle of the stifle-joint and allowing the patella to move outwards. In some cases the bone slips out and in of its own accord; in others, when out, it becomes fixed, the leg being rigid and fixed in a backward direction.

Reducing the dislocation is, as a rule, an easy matter.

PERICARDITIS.

Inflammation of the pericardium is occasionally seen in the horse, the ox, and the dog. In the ox it is usually traumatic, in which case treatment is practically of no avail. In other cases rheumatism is attributed as a cause, and it is also seen as a sequel to specific fevers. The patient should be kept as quiet as possible, placed on a laxative diet, and given a brisk purgative—aloin and calomel for the horse, sodium sulphate for the ox, and calomel for the dog. The patient is then placed on a course of salicylate of soda alternated with hyposulphate of soda. When the heart's action is weak or irregular, digitalis or strophanthus is indicated. Where pronounced effusion takes place, iodide of potassium is advised, and if there is an excessive accumulation of fluid present tapping the sac is necessary (see Paracentesis, Pericardial). In all cases a mustard plaster should be applied over the cardiac region, and repeated if necessary.

PERITONITIS, ACUTE.

So long as the surgery of the abdomen in the larger animals remains a closed chapter, so long will peritonitis claim its victims. Peritonitis is due to a great variety of causes: the penetration of foreign bodies, rupture of an internal organ, inflammatory extension through the visceral parenchyma to the visceral and parietal peritoneum; even, some authorities assert, exposure to cold will set up the condition. Acute peritonitis in the horse must always be looked upon as a fatal disease, while cattle appear to be more tolerant. Nevertheless, even in the ox, when bacterial infection arises from the rupture of an abdominal organ or the penetration of a foreign body from without, all treatment is usually hopeless. When treatment is undertaken, the following course may be adopted: keep the patient as quiet as possible, give a hypodermic injection of morphia and atropine, followed by a full subcutaneous injection of normal saline solution.

In the case of the horse administer a laxative—1 pint of linseed oil and ½ dram of calomel; in the ox, 1 pound of Glauber salts and 1 pound of treacle. Follow these up by giving every five or six hours full doses of camphor and chloral hydrate, and, if the temperature is high, salicylic acid. If the pulse is full and bounding, phlebotomy may be practised or tincture of aconite administered until an impression is made upon the heart. Saline enemas, especially in the horse, should be regularly administered, while extremely hot rugs or iced watered rugs are applied to the abdomen for prolonged periods. If there are pronounced signs of effusion, tapping may be practised, after which the abdominal cavity should be flushed out through the canula with sterile normal saline solution and proflavine.

In the dog and the cat, as soon as acute peritonitis is diagnosed, laparotomy is called for: firstly, as a means of establishing an accurate diagnosis; secondly, operating on a ruptured organ if present; and, thirdly, flushing out the abdominal cavity with a mild antiseptic such as normal saline solution to which is added boric acid or proflavine.* In all these cases, when suturing the abdominal wall, a drainage tube should be inserted.

PERITONITIS, CHRONIC.

As a result of the peritoneal inflammation, throwing out of considerable quantities of serum occurs (ascites), in which case tapping and the general treatment laid down for this condition is advised. In other cases the exudation of serum is very limited indeed, its place being taken by lymph in the form of flakes, creating adhesions at many points of the visceral and parietal peritoneum. This condition sets up a general unthriftiness of the patient, partly by reason of the fact that the normal peristaltic action of the bowels is seriously interfered with. In those cases occurring in the horse and ox, beyond administering diuretics, absorbents and tonics such as potassium iodide, ferri sulphate, cinchona, nux vomica, combined with a rich diet, little can be done. In the dog and cat, laparotomy, breaking down adhesions, washing out the abdomen with normal saline solution, and removal of the flakes of lymph by dry mopping, are well worthy of a trial.

PHARYNGITIS.

Inflammation of the pharynx is most commonly seen in the horse, occasionally in the ox, dog, cat, and pig. The disease seldom exists as a primary condition, extension usually taking place from the larynx. Further, in the horse it often takes on an epidemic form as a sequel to such specific fevers as strangles and influenza. In addition to the throat being sore and inflamed, there is great difficulty in swallowing, so much so, in fact, that even liquids are often partially or totally returned through the nose. On no account, therefore, should the animal be drenched, the danger of choking being too great. Medicines must therefore be given on the tongue in powder form or in the shape of an electuary. A purgative should be given at the outset, and the writer knows of no better agent to clear up a septic sore throat than calomel. For the horse and ox, 1 to 2 drams; for the pig, 10 to 20 grains; for the dog, 2 to 5 grains; and for the cat, $\frac{1}{4}$ to $\frac{1}{2}$ grain. This agent can be placed on the tongue as a powder or it may be given as an electuary. Spraying or painting the pharynx in animals is almost impracticable, save in the dog and the cat, in which case the following is useful:

---

* On no account should an iodine solution be used, owing to its tendency to produce plastic adhesions.

℞	Thymol	ʒi.
	Glycerini Boracis	ʒiii.
	Aquæ	ad ℥viii.

M. Ft. lotio. Spray or paint the throat three or four times daily.

In all animals a stimulating liniment or a mustard plaster should be applied to the throat, and repeated at intervals until the skin becomes irritable. There are many kinds of electuaries in use, each practitioner usually prescribing his especial favourite one. Hoare gives a very useful one in his "Veterinary Therapeutics" for horses:

℞	Pulveris Camphoræ Pulveris Myrrhæ Extracti Belladonnæ	āā ℥ss.
	Potassi Chloratis Mellis	āā ℥i.
	Glycerini	℥iv.

M. Ft. electuarum. One tablespoonful to be given on the tongue three or four times a day.

When a large number of animals are affected and a more economical electuary is called for, the following is advised:

℞	Acidi Borici Potassii Chloratis	āā ℥iv.
	Theriacæ	ad q.s.

M. Ft. electuarum. One dessertspoonful on the tongue every five hours.

When the temperature is high, salicylic acid should be added to the above prescriptions.

Unlike the practitioners of human medicine, veterinary surgeons cannot get their patients to gargle, but the writer has obtained beneficial results akin to gargling by throwing well back into the fauces antiseptic powders. The tongue is well withdrawn from the mouth by the left hand; an assistant opens the mouth by placing the fingers of each hand on the upper and lower jaw, pulling in opposite directions. The practitioner, with the powder now in the hollow of the right hand, throws it as far back into the mouth as possible. The animal may cough, but the paroxysm soon passes off, while the act of contracting the fauces helps to cover the mucosæ with the powder, and should an abscess be present this effort will tend to burst it. The powder is composed of boric acid, potassium chlorate, and sodium chloride in equal parts. This treatment should be carried out once or twice daily in addition to the electuary administration. When an abscess forms and is slow in bursting, it may be opened by a guarded lancet carried into the mouth or cut down upon through the skin. In the latter case, however, great care must be exercised not to injure vital vessels. After the skin has been incised, the underlying tissue should be broken down by a blunt director. When dyspnœa is imminent, tracheotomy may be called for. In those severe cases where deglutition is in abeyance, artificial feeding by the stomach tube or by nutrient enemas may be called for. The diet in all cases during the critical stage should be sloppy. The surroundings must be sanitary, the patient suitably clothed and protected from draughts.

PHLEBITIS.

Inflammation of a vein is not so common in animals as it is in man, nor is it as a rule fraught with so much danger to life save when the septic element exists. The primary danger to life, of course, is when embolism, through the detachment of clot from the inflamed and thrombosed vein, takes place. This risk is reduced by keeping the animal and the affected part as quiet as possible until the clot has either been absorbed or has become attached to the vessel wall. When a superficial vein is involved, hot fomentations, followed by a cooling lotion such as white lotion, should be applied to the part, and when the acute stage has been reduced massage is advised or a mild biniodide of mercury blister applied.

When septic infection is detected in a superficial vein it should be ligatured at a point distal from the heart, the diseased area laid open and the resultant wound irrigated with antiseptics.

When a deep-seated vein is involved, the principles of treatment laid down for septicæmia must be carried out.

PHLEBOTOMY. *See* **Blood-Letting.**

PHYMOSIS.

Inability to protrude the penis is occasionally seen in practice, and may be due to a variety of causes such as: (*a*) an excessive accumulation of debris, in which case washing with hot water and soap is indicated; (*b*) œdema of the prepuce following castration or debilitating diseases (here hot fomentations, scarification combined with diuretics, and tonics are necessary); (*c*) neoplasms or warts, necessitating surgical removal; (*d*) stricture of the sheath, congenital or acquired, in which case stretching is advised by using various-sized, well lubricated rollers of wood like a rolling-pin, as is used in baking. If this fails, the animal should be cast, anæsthetized, and two or three longitudinal incisions made on the inner skin and underlying tissue of the sheath. Subsequent treatment consists of daily stretching the sheath with wood rollers soaked in carbolic oil.

PICA.

Depraved digestion may be seen in any animal, but it is most commonly met with in the ox, the dog, the pig, and occasionally in the horse. A complete change of diet is of first importance. In the case of herbivora, if the animal is out of doors it should be housed and placed on bran oats, steamed hay, and boiled linseed, and *vice versa;* if it is indoors, a run at grass, if seasonable, may effect a cure. At the commencement of treatment an aperient is advised, followed by a course of stomachics, gentian, nux vomica, cinchona, ginger combined with alkalies such as bicarbonate of sodium or potassium, creta preparata, and where much irritability exists bismuth and opium may be tried. In other cases a better response may follow the administration of infusion of quassia and nitrohydrochloric acid. Common salt in the food is an excellent accessory.

In the dog an emetic is advised at the outset, followed later by a cascara pill and a course of liquor pepsin cum bismuth. The diet should be liquid for two or three days, milk—clear soups—while later on tripe, fish, chicken, raw mutton may be allowed.

In the pig, also, an emetic is advised, followed by a saline aperient, and the patient placed on a course of bismuth, sodium bicarbonate, and carbonate of magnesium. As regards diet, bran combined with, when obtainable, sour milk or whey; sharps, barley meal, and such foods should be severely withheld for some days; while a run at grass often exercises a more beneficial influence than drugs.

PINK EYE. *See* **Influenza.**

PIROPLASMOSIS.

This widely distributed class of disease affects bovines, horses, dogs, sheep, rodents, monkeys, etc., producing its pathogenic effects by the invasion, through the agency of one or other species of tick, of the red

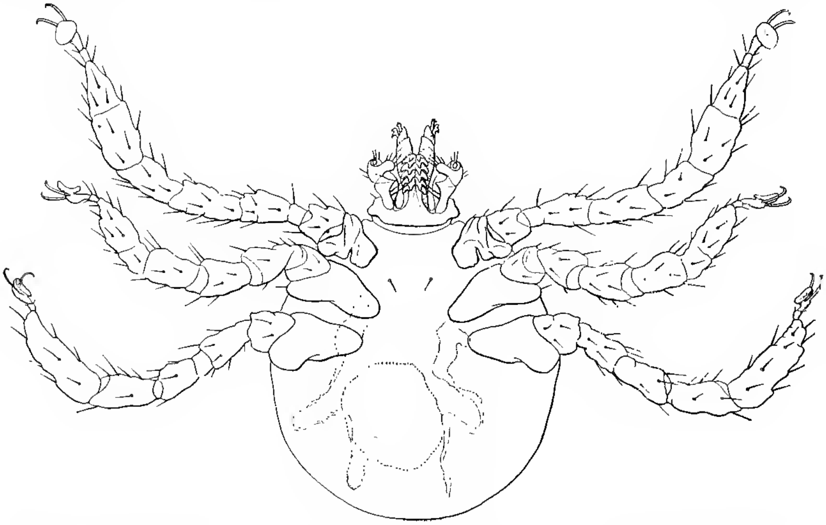

FIG. 135.—VENTRAL VIEW OF LARVA OF BOOPHILUS ANNULATUS OF NORTH AMERICA. (Enlarged.)
(Stile's Annual Report, U.S.A.)

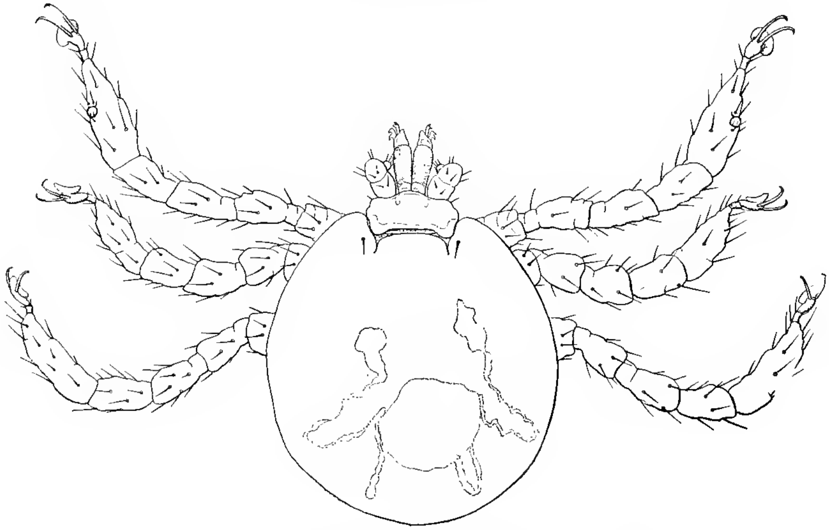

FIG. 136.—DORSAL VIEW OF THE ABOVE. (Enlarged.)
(Stile's Annual Report, U.S.A.)

corpuscle of the host's blood-stream, and there causing states of toxæmia, anæmia, and complications, leading in some of the piroplasmata to an almost invariably fatal result. In other instances the invasion of the piroplasm is attended only by constitutional symptoms of a greater or less degree of severity, followed by an immunity or tolerance, generally of a high order.

The chief diseases produced by these organisms are the destructive disorders known as Texas fever or redwater, and African or East Coast fever (*q.v.*), whilst biliary fever in horses and dogs, and heartwater in cattle, sheep, etc., are among the diseases attributable to the piroplasmoses.

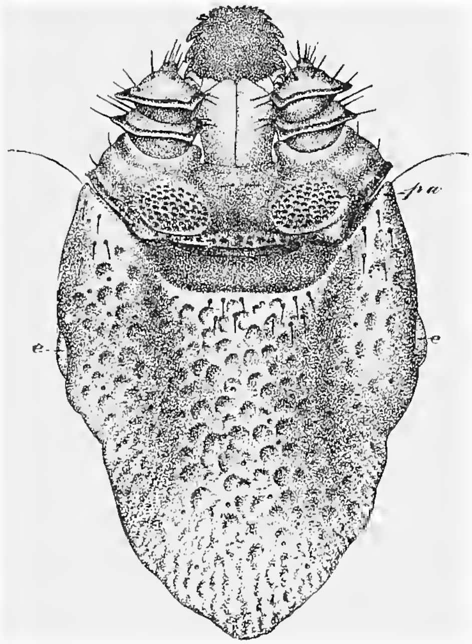

Fig. 137—Section of Scutellum of Female Boophilus annulatus, showing Mouth Parts, Porose Areas (*pa.*), and Eyes (*e.*) enlarged.
(Stile's Annual Report, U.S.A.)

As these maladies are essentially tick-borne in origin, their repression depends upon the destruction of the tick or protection against its attack (see Ticks). Happily, however, in certain of the piroplasmoses therapeutic measures may be successful where prophylaxis has failed. In some diseases—Texas fever of the ox, or biliary fever of the dog, for example—the injection into the blood-stream of aniline dyes such as methylene blue, trypan red, etc., is frequently attended with the disappearance of the intracorpuscular parasite and the restoration of the animal to normal conditions of health. Such dyes are used in a 1 per cent. solution, the quantity injected varying with the species and size of the animal. Arsenical compounds such as arrhenal, disodic arseno-benzol, and others are also of use as an injection in the case of Texas fever, rapidly causing the disappearance of the intracorpuscular organism (*Pyrosoma bigeminum*).

In other of the piroplasmoses, however, treatment is of small avail, especially in that most deadly disease, East Coast fever (*q.v.*), which has hitherto defied all lines of therapeutic approach.

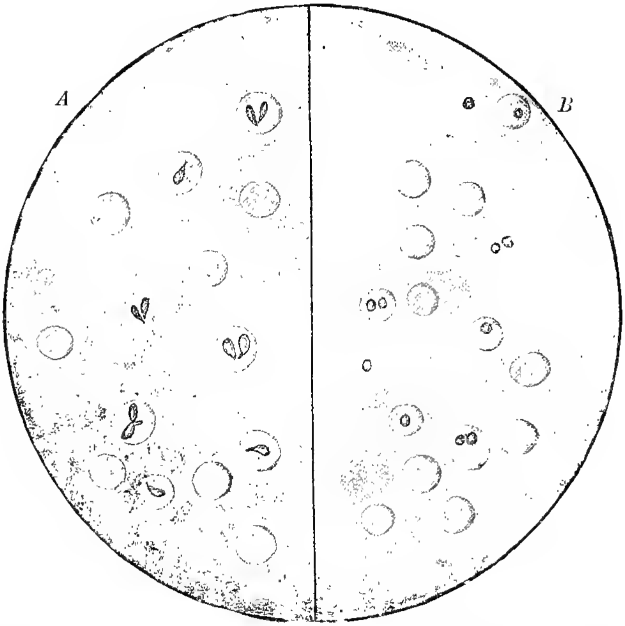

Fig 138.—*A*, Red Corpuscles containing Pear-shaped Piroplasma bigeminum; *B*, Red Corpuscles containing Round Piroplasma bigeminum. (After Lignières.)

But, fatal or curable, this class of disease exacts a heavy toll, whether of life or usefulness, and the question of the eradication of the disease group is bound up essentially with the eradication of the insect vector—the tick—which is responsible for the infection of the ultimate host, whether horse, ox, or dog.

With the disappearance of the tick will vanish also the many diseases included in the class piroplasmosis.—*H. Watkins Pitchford.*

Bovine.—The usual treatment consists in the administration of a purgative in the early stage of constipation followed by tonics and a nutritious diet. Large doses of quinine are advocated by some, whilst others rely on iron salts. The subcutaneous injection of sterilized salt solution is useful treatment. Specific remedies consist in the intravenous injection of solutions of trypan bleu, atoxyl, formalin, colloid silver (Finlay Dun), and arrhenal (Lignières), but none have proved absolutely effectual.

Preventive treatment consists in the removal of ticks from animals by dipping, etc., in the exclusion of cattle from tick-infested areas, and in the destruction of ticks. Cattle may be immunized by being injected with infected blood in order to produce a mild non-fatal attack. Results are irregular, however, and mortality may occur.

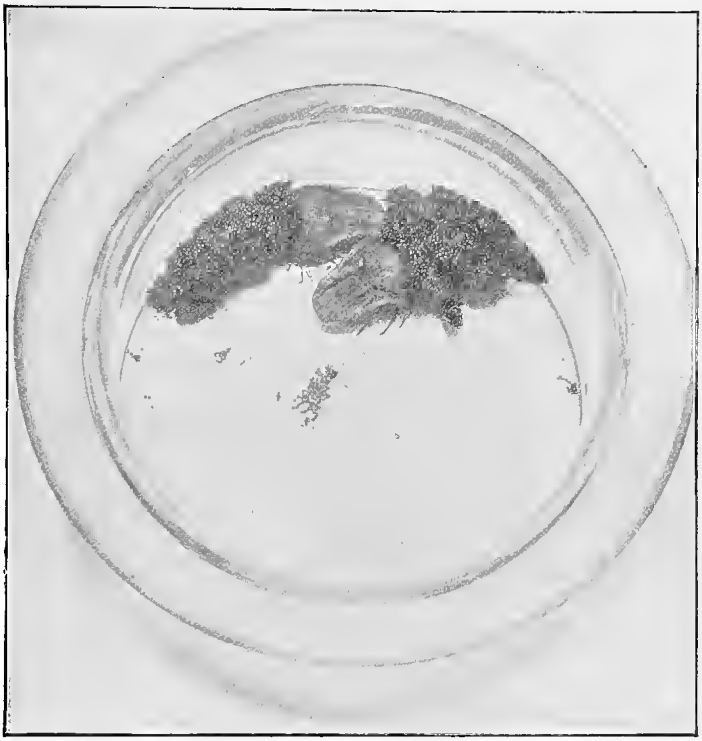

FIG. 139.—TWO FEMALE TICKS (HYALOMMA ÆGYPTIUM) OVIPOSITING. (Natural size.) (Photo by Emery, U.S.A. Bureau of Animal Industry.)

Canine.—In dogs the intravenous or hypodermic injection of a 2 per cent. solution of trypan bleu may be regarded as a specific in most cases, though some resist. One injection usually suffices, but, if not, it may be repeated. The dose of the solution commonly used is 5 to 10 c.c. Very strict aseptic precautions are necessary to avoid bad results. Good nursing and careful diet are concomitant factors for success. Dogs should be protected from the attacks of ticks.

Equine.—At the outset a purgative of aloes and calomel is recommended. Hygienic treatment, careful nursing, and easily digested food are first principles. Complications are not uncommon, and must be treated as they arise. Various specific remedies are recommended. Some of the most successful are the intravenous injection of hydrobromide of quinine (A. J. Williams) and quinine sulphate or bromide (Pierre). Large doses of quinine *per oram* are safer and generally effectual. "Salicylates and salts of mercury are found to be of value" (E. Wallis Hoare).—*G. K. Walker.*

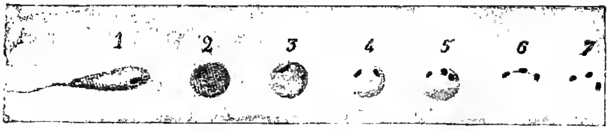

FIG. 140.—SLOW FORMATION OF FREE GERMS. (After Lignières.)

1, Pear-shaped organisms with large chromatic element and a flagellum; 2, newly developed round cell without chromatic element; 3, 4 and 5, formation of the chromatic elements; 6, the germs about to escape; 7, the germs freed.

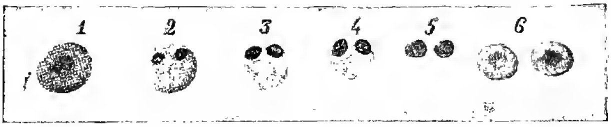

FIG. 141.—RAPID FORMATION OF FREE GERMS. (After Lignières.)

1, Newly developed round parasite without distinct germs; 2, round parasite with two germs; 3, the germs approaching the surface and undergoing development; 4, the germs beginning to grow outwards preparatory to forming new round parasites; 5, the process previously noted is becoming more marked; the protoplasm of the cell is undergoing degeneration, and scarcely stains at all; 6, round parasites. This completes the cycle. These parasites (6) are similar to (1).

PITYRIASIS.

The production of epidermal scales and loss of hair is most commonly seen in the horse, ox, and dog. It is usually due to dietetic errors and consequent alimentary derangement, but it is also occasionally bacterial. After giving a laxative the patient should be placed upon a course of alkalines, diuretics, and tonics such as bicarbonate of soda or potash, nitrate of potash, and iron and vegetable tonics. In obstinate cases a course of arsenic may be tried. Locally the skin is cleansed by washing in hot water, soap, and soda, and an emollient dressing applied occasionally, such as sulphur 1 ounce, liquor carbonis detergens 1 ounce, soap liniment 1 pint, rape oil 1 pint.

The diet should be completely changed, especially with the view of making it light and digestible.

PLACENTA, RETENTION OF.

Of all the animals to suffer most commonly from retained placenta the cow easily comes first, and although in this animal it seldom is the direct cause of death, it nevertheless carries with it a potential economic import owing to reduction of the milk-supply and a lowered general constitutional condition. In the mare retained placenta exercises a grave danger not only to health, but to life also, and while in the cow the after-birth may be retained for seven to ten days, speaking generally, without causing serious disease or death, in the mare it should never be allowed to remain longer than six to eight hours.*

In the cow palliative measures should be tried first by administering saline purgatives combined with treacle or sugar, citric acid, and salt. After several years' experience the writer looks upon treacle and citric acid as a most valuable combination, the therapeutic action appearing to be that of an osmotic and lymphagogue, bringing about an earlier separation of the fœtal envelopes. Such ecbolics, however, as ergot, savin, and carminative seeds appear to exercise no beneficial influence whatever in the expulsion of the after-birth. As retained placenta is often due to debility, a course of nux vomica and sulphate of iron is worthy of a trial. Should medicinal treatment fail, digital manipulation and traction is called for, particularly in hot weather, and this operation should not be too long deferred. The vulva and protruding placenta having been washed with an antiseptic, the operator lubricates his hand and arm with carbolic oil and passes it into the womb, and a number of the cotyledons gently squeezed between the fingers and thumb. The placenta near the os is then gathered into the hand and steady traction applied. If the after-birth has been retained for some days it will usually come away *en masse*, a point the obstetrician should carefully note by spreading it out on the ground, when the blind ends will be seen intact. In some cases the placenta will be so putrid as to give way on the slightest traction, and should any part be left in the womb it must be sought for and removed by the hand. In those cases of abortion or premature birth removal of the placenta is often most difficult, but diligent manipulation will usually effect removal. In neglected cases it is not uncommon to find the os almost closed and firmly grasping the envelopes, in which case the os should be smeared with belladonna ointment, and after a time a finger is inserted, then two, and finally all the fingers, cone-shaped, are rotated until the os has become sufficiently dilated to admit the whole hand. This accomplished, the envelopes are removed as indicated above.

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* The writer has met with one case in a mare where the placenta was retained forty-six hours, recovery being almost uninterrupted.

After removal, a considerable quantity of grumous-looking septic fluid will be found lodged in the womb. As much of this should be scooped out by the hand as possible, its removal being facilitated by making the animal stand on an incline and raising the abdominal viscera by placing a plank under the belly. Many authorities recommend irrigating the womb afterwards, but with this the writer does not agree. The insertion of pessaries has more benefits and less drawbacks than have irrigations. A simple home-made pessary, which the writer has found most useful, consists of boric acid ½ ounce, sugar 1 ounce, carbolic soap 2 ounces. Melt the latter, stir in the two former, pour into a cone-shaped mould, and allow it to solidify. The fœtal envelopes in the mare, by reason of their simpler anatomical arrangement, are less adherent than those of the cow, hence abnormal retention in this animal is not so commonly seen in equine practice, and further, when present, can as a rule be more easily overcome. As has been already pointed out, the placenta in the mare should not be allowed to remain longer than six to eight hours, owing to the danger of septic infection setting up metritis, pneumonia, laminitis, etc. On the other hand, it must be pointed out that it is a bad and dangerous practice forcibly to remove the after-birth immediately after parturition, the risks, of course, being uterine hæmorrhage—and consequently greater danger of septic infection—and uterine eversion. Medicinal treatment in the mare is of less value than in the cow, for, long before the necessary time has elapsed for any drug to take effect, the placenta should be removed. In removing the after-birth the greatest possible asepsis is required. The patient is twitched, the fore leg picked up, and the tail kept out of the way by assistants. The lips of the vulva are thoroughly washed with soap and an antiseptic solution. The operator's hands and arms are carefully washed in an antiseptic, and the nails scrubbed. The lips of the vulva, as well as the hand and arm of the operator, are then smeared with carbolized oil. The hand is now passed into the womb, the envelopes grasped, and steady traction applied. This, combined with straining on the part of the patient, generally succeeds in removing the placenta *en masse*. Careful examination is now made to ascertain if the whole after-birth has been removed. Should a portion be left in the uterus, which indeed is rare if care is used, it must be sought for and removed. If an excess of fluid is present in the uterus, its removal should be effected on the lines similar to that carried out in the cow, and a uterine pessary inserted.

Retention of the placenta in the smaller animals is very rare in practice; when present, steady traction generally effects removal.

PLETHORA. *See* **Obesity.**

PLEURITIS.

Inflammation of the pleura may exist as a primary condition or as a sequel to other specific infections, but in any case pathogenic bacteria are the root cause of the disease. Pleurisy may be acute or chronic.

Acute Pleuritis.—If the practitioner is called in in the early stages and the patient is in good condition, bleeding may be performed with excellent results, and a brisk purgative administered. For the horse, aloin and calomel; the ox and pig, sodium sulphate; the dog and cat, calomel. If the temperature is high and the heart's action is laboured, aconite and salicylate of sodium are indicated.

For the horse and ox :

℞ Tincturæ Aconiti
Sodii Salicylatis .. .. āā ʒi.
Camphoræ
Potassii Nitratis .. .. ℥i.

M. Ft. pulv. One three times a day in a pint of flax gruel.
For the pig, quarter the above doses.

For the dog :

℞ Tincturæ Aconiti .. .. ♏xxx.
Sodii Salicylatis .. .. ʒi.
Liquoris Morphinæ Hydrochloridi .. ♏xxx.
Aquæ Chloroformi .. .. ad ℥ii.

M. Ft. mist. One teaspoonful three times a day.
For the cat, half the above doses.

Local treatment in the early stages consists of the application of a mustard plaster 1 pound, strengthened by the addition of 1 ounce of oil of turpentine for the horse and ox. For the pig a cantharides blister, to which is added a little croton oil, is the best counter-irritant; while for the dog and cat the chest wall should be relieved of its hair and fur, and a thick layer of antiphlogistin applied to the skin. As the disease runs its course evidences of effusion may be detected. If this is slight reabsorption usually follows, but, if indications of excess are noted, no time should be lost in tapping the chest.

Chronic Dry Pleurisy.—This condition is occasionally seen in animals. Treatment consists of the administration of full doses of extract of belladonna and potassium iodide, with the repeated application of blistering ointment or liniment to the chest wall.

In all cases of pleurisy the surroundings of the patient should be made as sanitary as possible, kept free from draughts, the body and extremities properly clothed, and the diet light, digestible, and nutritious.

PLEURODYNIA.

When this condition is diagnosed a purgative should be administered, followed by a course of salicylic acid and iodide of sodium for the larger animals, and for the dog and the cat aspirin. Stimulating liniment should be applied to the chest, or a mustard plaster rubbed in.

PNEUMONIA.

Probably there is no disease which has given rise to such differences of opinion in regard to treatment as this. Thus we find that some practitioners advocate heroic measures from the outset. Some leave Nature to her own resources, while others rely on sero-vaccine therapy. Perhaps the most successful line of treatment is to be found between these extremes. The treatment of pneumonia must be looked upon in a logical light, and based on scientific teaching. With this object in view the therapist must always keep before him the following cardinal facts: (*a*) To reduce auto-intoxication and neutralize toxins; (*b*) to limit inflammatory progress; (*c*) to sustain the heart's action.

(*a*) **To Reduce Auto-Intoxication and Neutralize Toxins.**—As a result of bacterial growth the lungs become a veritable incubator, from which flows freely into the blood and lymph stream highly poisonous toxins exercising a direct paralyzing influence upon the whole metabolism. It is the duty of the practitioner to eliminate these toxins by the quickest possible channels. This is brought about by the following means:

Bleeding.—If called in in the early stages, and if the patient is full-blooded with a full and bounding pulse, bleeding from the jugular is advised, for by so doing the right heart is relieved, a certain amount of free toxin is removed, and blood-pressure lowered.

Laxatives.—For the horse, a dose of aloin and calomel; ox and pig, sulphate of soda and treacle; dog and cat, calomel.

Diaphoretics.—Salicylate of sodium, aconite (if the heart is strong), aspirin, antipyrine, acetate of ammonia, and spirits of ether nitrate.

Diuretics.—Nitrate of potash, chlorate of potash, citrate of ammonia, and citrate of soda.

Fixation Abscess.—This is obtained by injecting subcutaneously into the horse 10 to 20 c.c. turpentine, and the dog 1 to 2 c.c. over the shoulder-blade. Such a method produces a sterile abscess, and thereby stimulates leucocytosis.

In addition, one may cite, as a powerful toxin eliminator, normal saline infusion. Finally, to neutralize toxins, antitoxic sera are indicated.

In tabulating the above list of drugs, it must not be inferred that drastic and persistent drenching is advocated, a method often in itself defeating the ends which all sound practitioners have in view in conserving the patient's strength and assisting Nature, for it must be remembered that in many pulmonary affections, in addition to the nausea produced in over-drenching, there is always a risk of choking the patient. This latter risk, of course, can be overcome by giving the medicine in electuary or bolus form.

(*b*) **To Limit Inflammatory Progress.**—This is an all-important point, but in the fulfilment the practitioner encounters many limitations. Much, however, can be done in this direction if the case is attacked early by counter-irritants to the chest wall, of which none is better than mustard; by administering decalcifying agents—the calcium content is always high in pneumonia—such as citric acid, which prevents coagulation in the pulmonary capillaries, while iodide of sodium also tends to keep the blood fluid.

(*c*) **To Sustain the Heart's Action.**—This is best accomplished by the hypodermic injection of such agents as strychnine, digitalin, caffeine, camphor oil, normal saline solution, and the inhalation of oxygen.

Sero-Vaccine Therapy.—If the case is running a very acute course, a polyvalent serum is to be preferred to a vaccine, for in the use of the former no negative or depressing phase is encountered. To employ biological preparations, however, in a satisfactory manner one must definitely ascertain the type of organism or organisms the patient is fighting against. This can only be ascertained by taking *materiès* direct from the lung tissue through the chest wall in lung puncture.

Lung Puncture.—For the larger animals a 50 to 100 c.c. capacity perfectly fitting air-tight syringe is necessary, with a needle measuring 4 to 6 inches long, while for the smaller patients a 6 to 10 c.c. syringe answers the purpose. The plunger of these syringes must be made of metal and fit accurately to the glass barrel. The syringe should be so constructed that it can be taken to pieces for sterilizing purposes. The point of the needles are bayonet-shaped, and a few perforations are made along the wall close to the pointed ends.

In the case of the horse the nose is twitched; while the cow is held by the nose and horn. The diseased area having been located in the lung by auscultation and percussion, the skin covering an intercostal space is shaved and thoroughly sterilized. The sterile syringe is now charged with 2 to 4 c.c. of sterile culture broth; the needle is plunged through the chest wall into the lung parenchyma at a point close to the anterior edge of the rib. The broth is then forced into the lung tissue, and after a few seconds is aspirated back into the syringe again. The nutrient, now laden with active germs, is examined microscopically, the type of organisms noted, and cultivation carried out on appropriate media with a view to preparing an autogenous vaccine.

If the pneumonia is very acute, and after a polyvalent serum has been given, it is advisable to begin with very small doses of vaccine, gradually increasing, and repeating them every forty-eight hours until three doses have been given, and then every third day until the lungs have cleared up and the patient is convalescent. The size of the dose must be left in the hands of the practitioner to a large extent. If after the first injection there is no systemic aggravation, as indicated by the pulse and temperature, or focal increase of the inflammation, as noted by the inspiration and by auscultation, then the second dose may be safely increased. On the other hand, if there is a very marked reaction the dose is too large, and the second should be made slightly smaller and deferred for a day or two.

Diet.—This is a most important factor, and should be at once both laxative and digestible. For horses and cattle, sloppy bran, crushed oats, boiled linseed, steamed hay, carrots, swedes, and green foods. These should be supplied in small quantities, and that which is not eaten in a reasonable time should be removed. There is nothing that nauseates an animal more than a manger full of food continually in front of it. For the dog, milk, milk puddings, patent foods, meat extracts, soups, and, later, tripe, fish, scraped mutton, vegetables, etc. An abundance of fresh water is very essential, as it tends to keep the blood fluid and flushes the kidneys and bowels, thereby assisting in toxin elimination. The injection of normal saline solution and the ingestion of common salt create thirst, thus serving manifold purposes.

Hygiene.—Healthy surroundings are most essential. The drains should be above reproach. There must be abundant overhead ventilation and ample sunlight. The body should be clothed warmly, but lightly, and in the larger animals the legs hand-rubbed and bandaged.

PNEUMOTHORAX.

Air in the chest is seldom seen save as a result of severe injury. When it is slight it will probably escape undiagnosed. If it is pronounced and grave symptoms supervene, the air should be aspirated from the chest. It is inadvisable to use an ordinary trocar, for by this means as the air escapes it will also rush in. If there are symptoms of cyanosis and great distress, bleeding and the administration of diffusible stimulants such as alcohol or ammonia are indicated. When the presence of air is due to a wound in the chest wall, this must be made as sterile as possible and firmly packed with gauze.

POISONING AND POISONS.

General Treatment.—When an animal is known to have ingested a poison, immediate action is imperative, and often first aid measures, if judiciously applied, are the means of saving life by saving time. Diluting the poison by giving copious draughts, emptying the stomach by home applied emetics such as mustard and water, salt and water, or by tickling the fauces with a brush or feather. When respiration has ceased, artificial means should be adopted and stimulants placed on tongue, such as neat whisky.

1. *Emetics.*—In those animals which vomit, an emetic should be given. The more technical emetics are—(*a*) Ipecacuanha: the dose for the pig, 1 dram; dog, $\frac{1}{2}$ dram; cat, 10 to 15 grains. (*b*) Sulphate of zinc: pig, 15 to 25 grains; dog, 10 to 15 grains; cat, 3 to 5 grains. (*c*) Tartar emetic: pig, 5 to 10 grains; dog, 3 to 6 grains. (*d*) Apomorphine hydrochloride (hypodermic): pig, $\frac{1}{10}$ to $\frac{1}{5}$ grain; dog, $\frac{1}{25}$ to $\frac{1}{10}$ grain; cat, $\frac{1}{75}$ grain. In some cases of poisoning, when the jaws are tetanized, as in strychnine poisoning, it is often impossible to give an emetic, apomorphine being the alternative, hypodermically.

2. *Stomach Pump.*—When this instrument can be used much good will follow, for not only is the poison eliminated, but the walls of the stomach can be well washed with water containing, if desired, corrective agents, and even, in suitable cases, direct antidotes. But here also the stomach pump may be impracticable, owing to closure of the jaw or restlessness and even frenzy caused by certain poisons. When the instrument is used, great care is necessary to see that it reaches the stomach and does not pass into the trachea, and that damage of tissue does not follow its passing.

3. *Retard absorption* by administering such agents as tannic acid, permanganate of potash, and adrenalin *per oram.*

4. *Eliminate the poison* by purgatives, laxatives, diuretics, diaphoretics.

5. *Administer antidotes* when known.

6. When the poison is not known, symptoms as they arise must be treated on rational lines.

Special Treatment—*Aconite.*—Empty the stomach by emetics or pump where possible. Administer tannin or potassium iodide (Landor); also permanganate of potash. Sustain the heart's action by giving diffusible stimulants such as ammonia, brandy, coffee, with digitalis or hypodermic injections of digitalin, caffeine, strychnine, or ammonia, inhalations of amyl nitrate. Maintain the circulation by massaging the extremities, and where possible keep the head lower than the rest of the body.

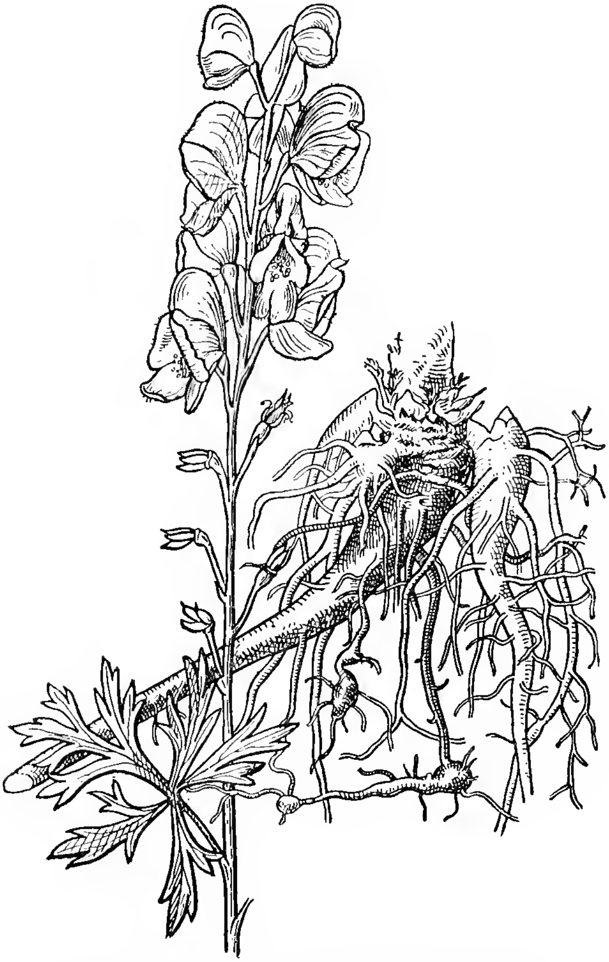

FIG. 142.—ACONITUM NAPELLUS (MONK'S HOOD).
(From Smith's "Veterinary Hygiene.")

Acorns.—Cattle appear to be the only animals subject to acorn poisoning, and in some seasons and in certain districts it often assumes serious proportions. As there is no known antidote, treatment must be directed upon symptomatic lines. Unload the stomach and bowels by purgatives. This is not always an easy matter, the condition often defying the usual methods of treatment. Begin by giving ½ pound of sodium chloride, 1 pound of sodium sulphate, and 1 pound of treacle in well-boiled flax gruel. Encourage the patient to drink plenty of water, and to help purgation exercise should be ordered; also massage the stomachs. Linseed oil may be given at intervals if necessary, and in addition nux vomica, carbonate of ammonia, and bicarbonate of soda to assist in rousing the alimentary paresis. If the case is seen early and the rumen is laden with ingesta, rumenotomy should be seriously considered.

Alcohol.—This form of poisoning occurs in practice following the ingestion of fermented yeast, brewers' grains, decomposing apples, and cider. Administer a brisk purgative coupled with an antizymotic such as hyposulphate of soda, turpentine, boric acid, and camphor in cases of fermentation. If the tympany is great, especially seen in apple ingestion, tapping the rumen may be called for. When there are indications of coma, ammonia and coffee *per oram*, and strychnine and caffeine subcutaneously, are advised. Maintain the body heat and massage the extremities.

Aloes.—Gastro-intestinal sedatives such as opium and bismuth or chlorodyne and bismuth and full doses of morphia hypodermically. Later, milk, eggs, and starch gruel combined with prepared chalk and cinnamon. Small quantities of liquids only should be allowed.

Alsike Clover.—The animals most commonly affected adversely by this clover in the writer's experience are lambs, although older sheep are not immune; also, in certain seasons, horses may succumb. Removal from herbage containing the clover is the first necessary step. A laxative aperient having been given, gastro-intestinal sedatives should be administered. For the horse, opium and bicarbonate of soda; for sheep, tincture of chloroform and morphia and bicarbonate of soda in well-boiled linseed tea.

Ammonia.—The antidotes for ammonia poisoning are dilute acids such as vinegar (Landor); old cider may be used in emergencies; also dilute hydrochloric acid. The alimentary mucosæ being deeply inflamed, demulcents and eggs, with lime water and linseed oil combined with sedatives such as opium, belladonna, chlorodyne, are indicated. If the patient is in much pain, hot fomentations to the abdomen and hypodermic injections of morphia and atropine. If there are symptoms of collapse, camphor oil and normal saline solution subcutaneously. Tracheotomy may be necessary if œdema of the glottis is great.

Antimony (*Tartar Emetic*).—Evacuate the stomach contents by means of the pump or emetics, and administer a dose of linseed oil combined with tannic acid. If there is much pain give chloral hydrate, opium, or camphor, and hypodermic injections of morphia. If symptoms of collapse occur, inject brandy, digitalin, or strychnine subcutaneously over the cardiac region.

Arsenic.—Empty the stomach by emetics or by the pump when practicable. Administer an oily purgative, followed by eggs, linseed gruel, and lime water. As an antidote give hydrated peroxide of iron prepared by mixing sulphate of iron (100 parts) with water (250 parts), and calcinated magnesia (15 parts) with water (250 parts). The dose for the horse and ox is 20 to 30 ounces, for the pig and sheep 5 to 10 ounces, for the dog 1 to 2 ounces (to be given every fifteen to twenty minutes). In emergency cases any salt of iron should be used, particularly dialyzed iron or hydrated magnesia. This latter agent is very useful in preventing gastritis (Landor). If the patient is in much pain, hypodermic injections of morphia and atropine are advised. It also tends to retard absorption.

When one is dealing with sheep during the dipping season, it is hardly necessary to add that prevention is of much more economic importance than cure. Over-concentration of the dipping fluid, accidental or intentional, should be warded against, also submerging the head when dipping, taking the precaution not to allow the flock to reach the pasture-land until the "dripping" has ceased, withholding sheep from the dip when suffering from extensive flesh wounds.

Barium Chloride.—The stomach should be emptied by emetics or the pump, and sulphate of sodium or magnesium administered to form the insoluble sulphate, and giving hypodermic injections of strychnine to keep the heart going. As the pain is great, sedatives are called for—morphia, opium, bromide, and chloral hydrate.

Beech-Nut Oil Cakes.—Administer an oily purge combined with tannic acid. To relieve the spasms give morphia hypodermically, and chloral hydrate with camphor *per oram.*

Belladonna.—Remove the poison by emetics or by the stomach pump; give permanganate of potash. Rouse the animal from stupor as much as possible by moving it about or throwing cold water on the head and body. Stimulate the heart and circulation by administering stimulants such as alcohol, ammonia, coffee, and the hypodermic injection of caffeine, digitalin, and pilocarpine. Empty the bladder.

Box Leaves.—Administer a brisk purgative combined with carbonate of ammonia, followed by repeated doses of tannic acid.

Bracken.—As there is difficulty in discovering the nature of the poison, treatment of the symptoms as they present themselves must exercise the practitioner's attention. These consist in giving purgatives combined with diffusible stimulants.

Brine.—Salt poisoning is most commonly seen in the pig, that animal being particularly susceptible to its poisonous effects. Administer an oily purge, followed by repeated doses of opium or chlorodyne combined with bicarbonate of soda and bismuth, and if there is great depression diffusible stimulants combined with an abundance of water.

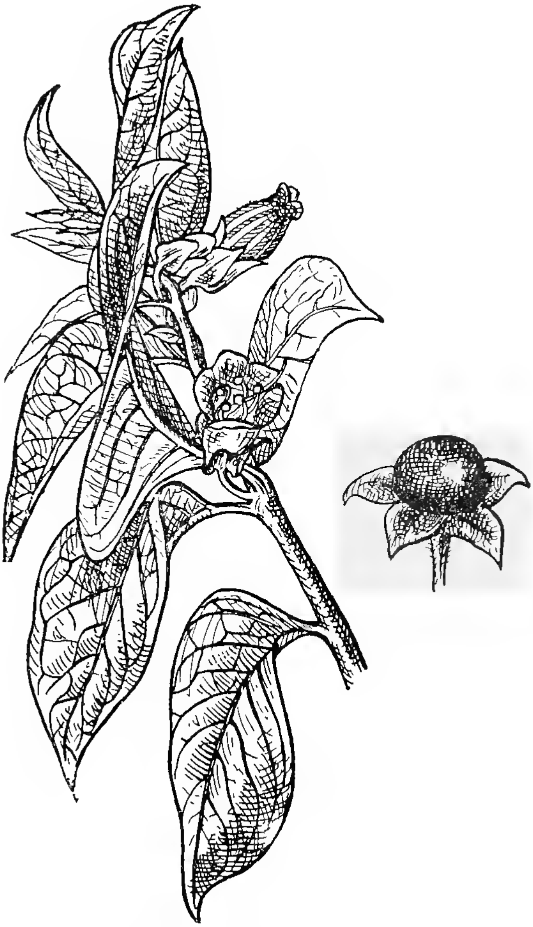

FIG. 143.—ATROPA BELLADONNA (DEADLY NIGHTSHADE)
(From Smith's "Veterinary Hygiene.")

Bromides.—Remove the salt from the stomach, administer diffusible stimulants, and inject strychnine, and caffeine subcutaneously.

Buttercup.—Administer a purgative, followed by repeated doses of ammonia and camphor.

Butter of Antimony.—Empty the stomach, give magnesia or soda, lime water, linseed oil, and sedatives.

Caffeine.—Strychnine, artificial respiration.

Cantharides.—When the poison is ingested, emetics or stomach pump should be used. If poisoning is due to absorption through the skin as a result of blistering, the cantharidin acts specially as a kidney irritant in the process of elimination. Treatment consists in giving an abundance of mucilaginous drinks with plenty of eggs. If there is much pain, morphia injections are advised. When the kidneys are deeply involved, treatment for nephritis is called for. If due to blistering, immediate measures should be made to remove the blister by washing with hot water and soap, but on no account should oil be used.

Carbolic Acid.—Administer emetics or use pump. Give a full purgative, followed by alterative doses of sulphate of soda mixed in linseed tea and eggs beaten up. If symptoms of collapse manifest themselves, give full doses of aromatic spirits of ammonia. The subcutaneous injection of normal saline solution with a little brandy added also acts as a cardiac stimulant. Iodine is said to be an antidote.

Carbon Monoxide.—Remove the patient to the fresh air. Apply artificial respiration, if necessary combined with oxygen inhalation, with strychnine and normal saline injections. Electricity, the positive pole in the rectum and the negative in the mouth, has been recommended for small animals (Landor).

Castor Oil.—Poisoning here may follow an overdose of the oil or ingestion of the cake derived from the seeds. Remove contents from the stomach, counteract superpurgation by giving chlorodyne or opium and camphor in large doses of starch gruel. Diffusible stimulants may also be given with advantage.

Chloroform.—Remove the mask, apply artificial respiration, allowing plenty of fresh air, give inhalations of ammonia or amyl nitrate, draw the tongue rhythmically backwards and forwards, drop hydrocyanic acid on the tongue or eye (Hobday), and inject atropine or scopolamine.

Colchicum.—Give emetics or use the pump. Administer linseed oil and flax gruel combined with stimulants and injections of strychnine or caffeine, and saline solution. Remove stomach contents and administer demulcents combined with chlorodyne and camphor. If there is prostration, give brandy. If severe brain symptoms set in, bromide of potassium and chloral are indicated.

Conium.—Remove stomach contents, give a purgative, followed by tannic acid combined with brandy. If symptoms of collapse set in, hypodermic injections of atropine.

Copper.—Give emetics or use the stomach pump. Administer large doses of linseed gruel and eggs combined with reduced iron, magnesia (calcinated), sulphur. If there is much pain, also administer narcotics.

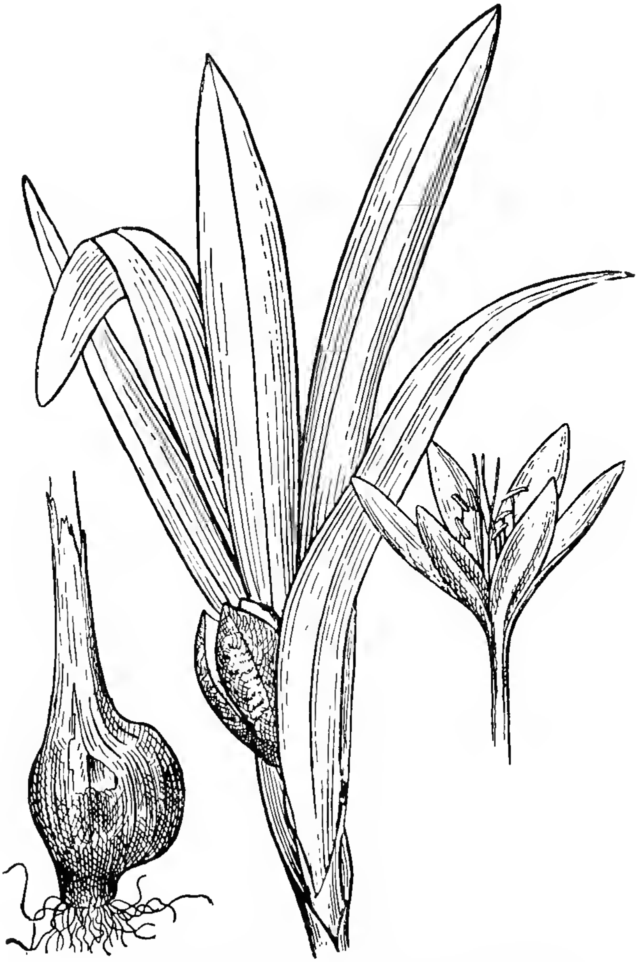

FIG. 144.—COLCHICUM AUTUMNALE (MEADOW SAFFRON).
(From Lander's "Veterinary Toxicology.")

Corrosive Sublimate.—Remove stomach contents. Administer whites of eggs and full doses of sulphur. If there is much pain inject morphia, and if symptoms of collapse, stimulants. If poisoning is due to local absorption, wash the skin or wound with hot water, soap, and soda.

Creasote.—Emetics or stomach pump, white of egg coupled with an abundance of linseed tea and oily purgatives. Opium or chlorodyne may also be given to soothe the alimentary mucosæ and case the pain.

Croton.—Wash out the stomach, give an abundance of linseed tea, and administer opiates.

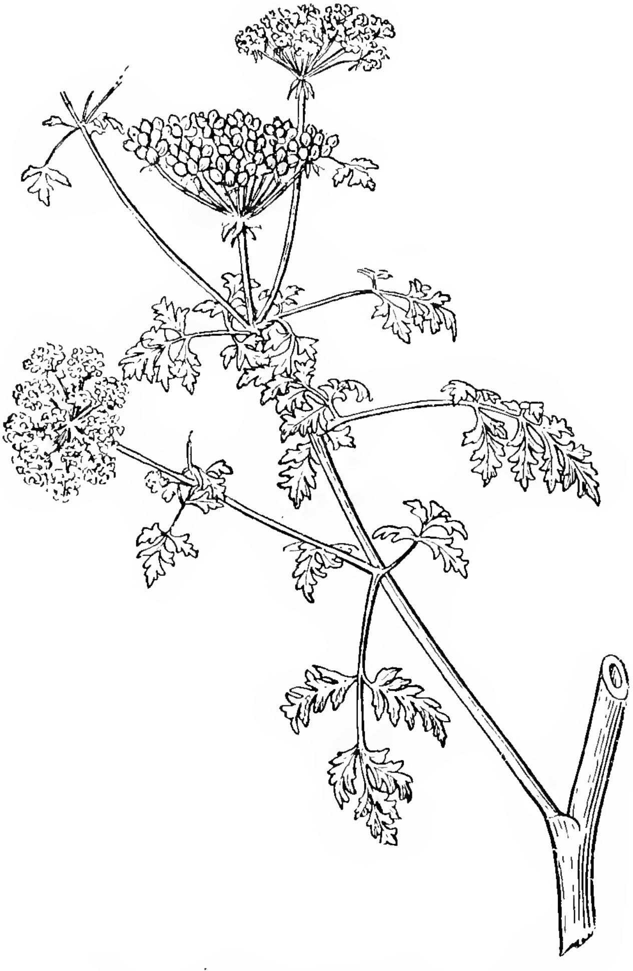

FIG. 145.—CONIUM MACULATUM (SPOTTED HEMLOCK).
(From Smith's "Veterinary Hygiene.")

Cruciferæ.—Administer sodium sulphate and treacle until the stomach and bowels are unloaded. Carbonate of ammonia and nux vomica should also be given.

Darnel Grass.—Administer a full purge, followed by tannic acid combined with stimulants.

Deadly Nightshade.—See Belladonna.

Digitalis (*Foxglove*).—Empty the stomach; give a full purgative dose, followed by linseed gruel combined with ammonia or alcohol and tannic acid; hypodermic injections of aconitine.

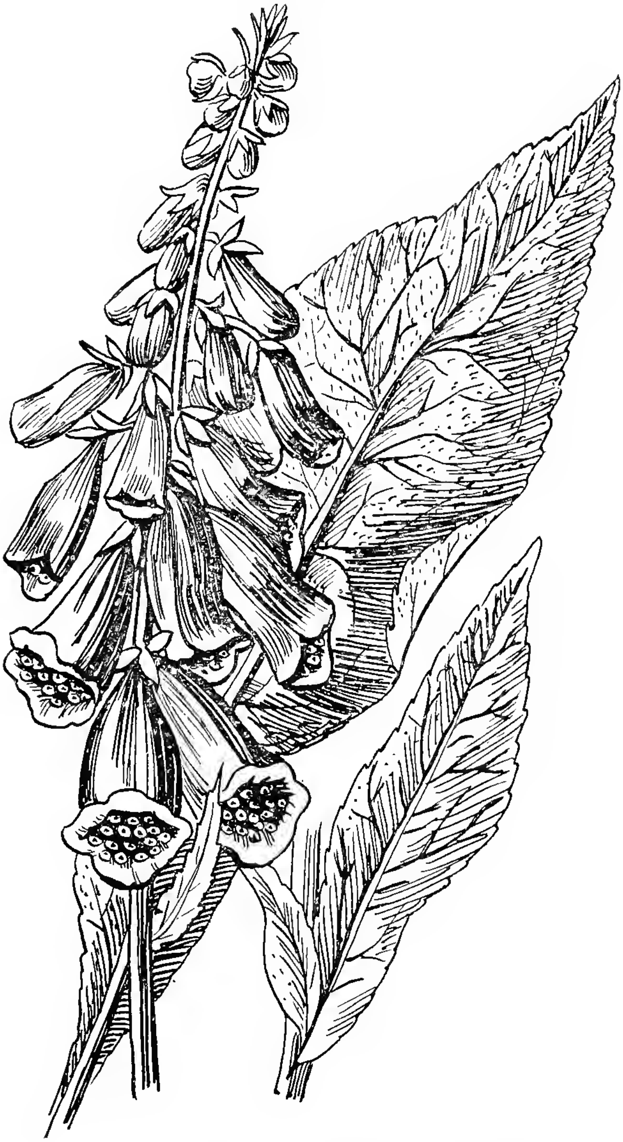

Fig. 146.—Digitalis purpura (Foxglove).
(From Lander's "Veterinary Toxicology")

Epsom Salts.—Withhold water and give thick flour or starch gruel to drink. Administer full doses of opium combined with prepared chalk. Hypodermic injections of morphia are also indicated.

Ergot.—Administer a purgative, followed by repeated doses of tannin and tincture of aconite and morphia injection.

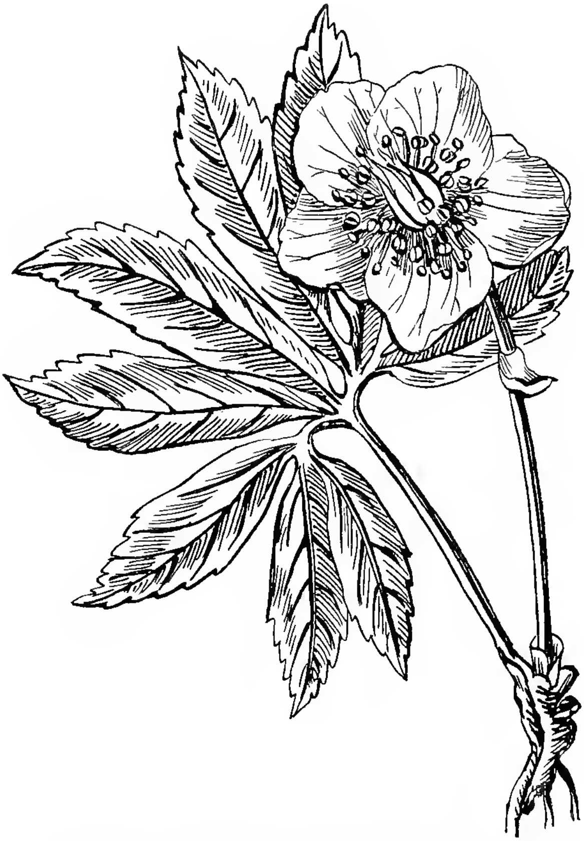

Fig. 147.—Helleboris niger (Black Hellebore).
(From Lander's "Veterinary Toxicology.")

Eserine.—Overdoses of eserine should be counteracted by inhalation of ammonia and hypodermic injections of atropine in small doses repeated often.

Fool's Parsley.—Administer a purgative, followed by tannic acid, camphor, and carbonate of ammonia.

Foxglove.—See Digitalis.

Glauber's Salts.—See Epsom Salts.

Hellebore.—Administer an oily purge. Counteract spasms by giving chloral hydrate and camphor. Hypodermic injections of morphia and atropine. Diffusible stimulants are also useful.

Hemlock.—Give a purgative; repeated doses of tannic acid combined with stimulants.

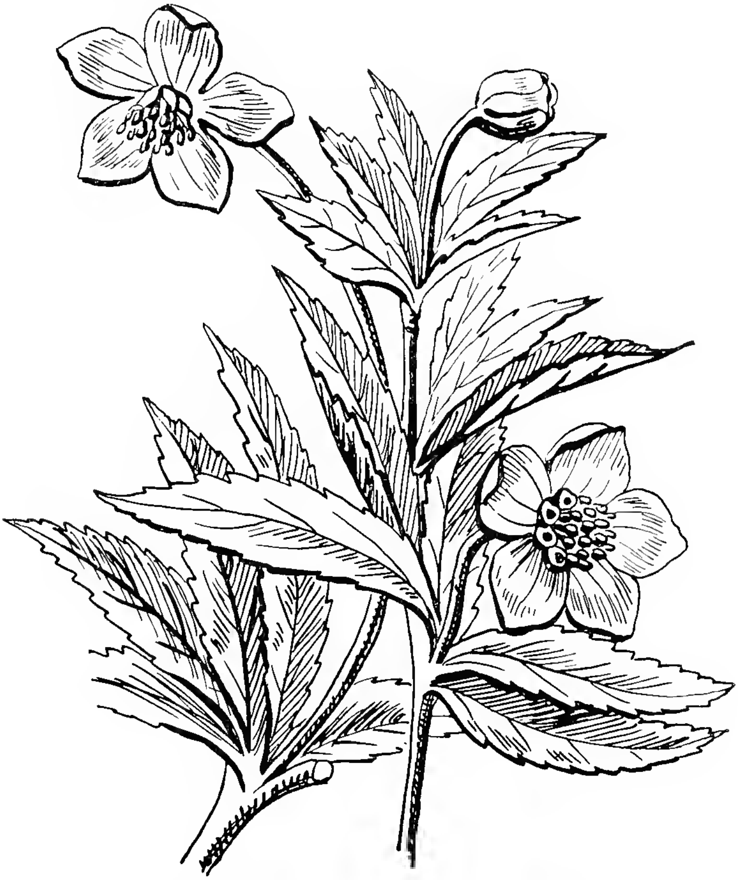

FIG. 143.—HELLEBORIS VERIDIS (GREEN HELLEBORE).
(From Lander's "Veterinary Toxicology.")

Horse-Radish.—Give an oily purgative, and to counteract the spasms chlorodyne, opium, camphor, chloral, and also hypodermic injections of atropine and morphia.

Hydrochloric Acid.—Evacuate the stomach contents. Administer linseed, eggs, and bicarbonate of soda.

Hydrocyanic Acid.—Administer emetics or use stomach pump. The prompt action of the drug, however, leaves little or no chance to assist recovery when a lethal dose has been given. The antidote is fresh precipitated ferrous hydrate (Landor). Hypodermic injections of peroxide of hydrogen.

Iodoform.—Give emetics, an oily purgative, and full doses of starch gruel.

Iron Salts.—Large doses produce gastro-enteritis. Unload the stomach by emetics or the pump, give an oily purge, followed by bicarbonate of soda, eggs, and opium. Tannic acid may also be given.

Laburnum.—Administer a purgative combined with tannic acid and diffusible stimulants. Hypodermic injections of ammonia.

Lathyrism.—Perform tracheotomy when necessary, and administer a full purgative dose.

Lead Salts.—Empty the stomach by emetics or pump. Administer strong saline purgatives, followed by medicinal sulphuric acid, tannic acid, eggs, milk. When there is prostration, give stimulants and hypodermic injections of digitalin and caffeine. In chronic plumbism potassium iodide is said to facilitate elimination (Landor).

Lysol.—See Carbolic Acid.

Male Fern.—Empty the stomach, give a laxative, but not an oily one, which greatly hastens absorption. Administer stimulants such as ammonia or whisky.

Meadow Saffron.—See Colchicum.

Mercurialis (*Dog's Mercury*).—Administer a purgative, followed by carbonate of ammonia and alcohol.

Milk Weeds.—If tympany of the rumen is present, use trocar and canula. Give a dose of Glauber's salts, common salt, and treacle, followed by repeated doses of chloral and bromide of potassium.

Moulds.—Evacuate stomach contents when possible, give a purgative, followed by antizymotics—*i.e.*, carbolic acid, Lysol, turpentine, creasote, salicylic acid, salol, and potassium iodide. Enemas also assist in elimination. If the animal becomes delirious, give full doses of chloral hydrate.

Mustard.—This is sometimes mixed with cakes. Unload the stomach, give a full purgative dose. If tympany is present, tap the rumen and administer antizymotics: carbolic acid, salicylic acid, salol, creasote, turpentine combined with tannic acid. If there is much pain, give chloral hydrate, which is both sedative and antiseptic.

Nicotine.—Evacuate the stomach by pump or emetic. Administer a purgative, followed by bromide of potassium and hypodermic injections of caffeine and strychnine; alcohol or ammonia if the heart is weak.

Nitric Acid.—Give an emetic or use stomach pump. Administer an alkali diluted in linseed gruel, mixed with which is butter. If the pain is great, give opiates and inject morphia.

Nux Vomica.—Administer an emetic or use the pump where possible. Give full doses of chloral repeated often, also Condy's Fluid. If there is difficulty in swallowing, use the stomach pump or, in the case of cattle, pass the drug into the rumen direct through the canula. Hypodermic injections of morphia and atropine may be tried.

Œnanthe Crocata.—Evacuate stomach contents. Administer a laxative, followed by anodynes combined with antiseptics and tannic acid.

Oleander. — Evacuate contents by emetics, stomach pump, laxatives. Administer stimulants combined with chloral and camphor.

Opium. — Remove stomach contents, give a purgative. Rouse the animal by stimulants, including coffee; inject caffeine or strychnine; apply cold douches to the head; artificial respiration; administer permanganate of potash.

Oxalic Acid.—Evacuate stomach contents, give an oily purge, followed by small doses of carron oil—equal parts of linseed oil and lime water—repeated often. If there is much pain, give chloral or chlorodyne. Inject strychnine if necessary.

Phosphorus.—Empty the stomach, give a purgative, but not an oily one (Landor). Administer sulphate of copper, peroxide of hydrogen, permanganate of potash, or turpentine in flour, starch gruel, or milk.

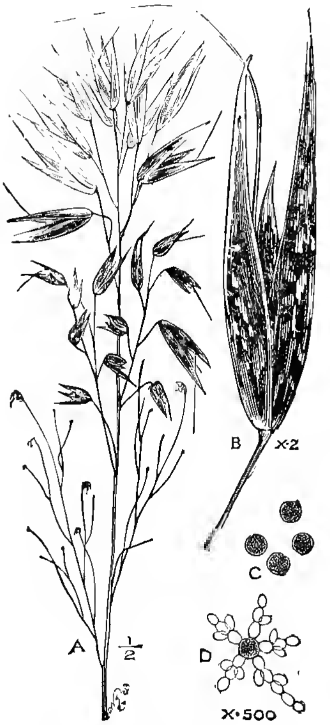

FIG. 149.—SMUT OF OATS.

A, Panicle of oats attacked from below upwards; *B*, spikelet, with the fungus in an early stage of growth; *C*, free spores of *Ustilago carbo*; *D*, spores germinating and producing yeast-like buds.

(From Smith's "Veterinary Hygiene.")

Physostigmine.—See Eserine.

Pilocarpine.—When an overdose of this drug has been given atropine should be given immediately, and repeated at intervals, and tannic acid administered.

Poppies (Wild).—Give a purgative, followed by tannic acid and stimulants such as camphor, ammonia, alcohol. Apply cold douches to the head.

Potash, Caustic.—Administer weak acids such as vinegar, anodynes combined with demulcents, and plenty of liquids.

Potatoes.—Administer a full purge, followed by tannic acid, carbonate of ammonia, and chloral hydrate.

Prussic Acid.—See Hydrocyanic Acid.

Ptomaines.—Give an emetic or use stomach pump, and in the case of the latter wash out the stomach with permanganate of potash in weak solution. Administer a purgative to which calomel and boracic acid have been added. If there is great prostration, inject normal saline solution with brandy. If the heart is weak, inject digitalin, caffeine, or strychnine. If there are signs of shock, give stimulants.

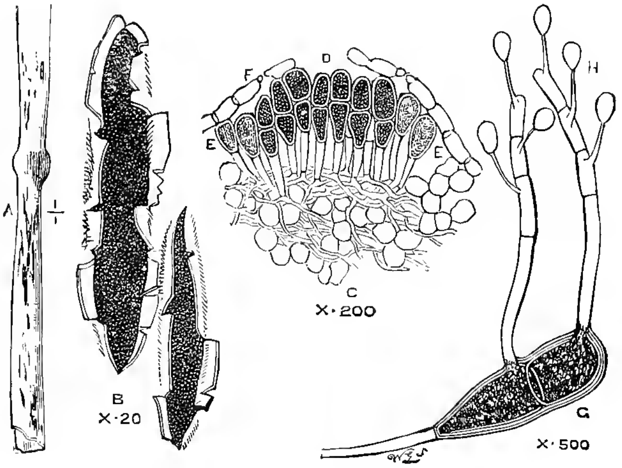

FIG. 150.—RUST AND MILDEW.

A, Part of stem of oat plant attacked by *Puccinia graminis; B*, two of the blotches from *A* enlarged 20 diameters; *C*, *P. graminis* within the stem, but near the surface, bursting the cuticle at *D*, beneath which are seen teleutospores; *E*, *E*, spores of *Uredo linearis; G*, teleutospores germinating and producing sporidia at *H*. These sporidia on germinating give rise to *Æcidium berberidis.*

(From Smith's "Veterinary Hygiene.")

Radish.—See Mustard Poisoning.

Ranunculus.—Empty the stomach, administer a purgative, and follow by tannic acid and opium in plenty of flax tea.

Rape-Seed Cake.—See Mustard Poisoning.

Rhododendron.—Administer a full purgative dose, followed by carbonate of ammonia and nux vomica.

Rye Grass.—Give an oily purgative, followed by chloral hydrate and carbonate of ammonia in flax gruel.

Saltpetre.—Give emetics or use pump; order abundance of liquids; give an oily purge. If there is prostration, give camphor, coffee, alcohol, ammonia.

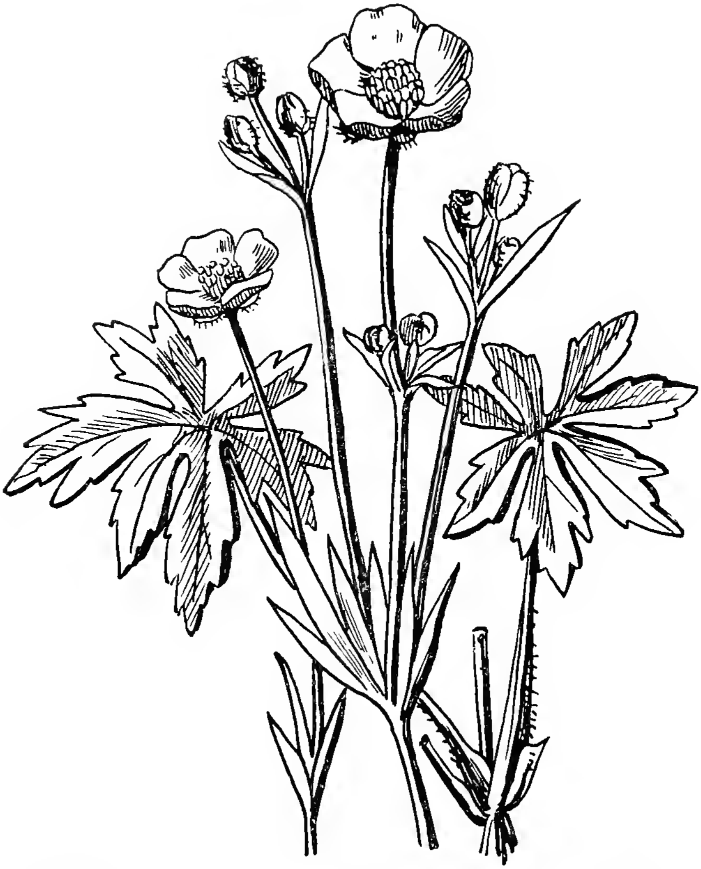

FIG. 151.—RANUNCULUS ÆRIS (UPRIGHT MEADOW CROWFOOT). (From Lander's "Veterinary Toxicology.")

Santonin.—The dog is the most common victim to santonin poisoning. Give emetics and a purgative. If there is collapse, inject caffeine. If convulsions are present, give chloral and bromides (Landor).

Savin.—Evacuate stomach; give a laxative combined with tannic acid, ammonia, and opium or chlorodyne.

Silver Salts.—Give emetics or use the stomach pump. Administer white of egg and salt largely diluted with milk. If there is much pain, add opium.

Strychnine.—See Nux Vomica.

Sulphur.—Give emetics or use pump. If tympanitic, use trocar. Administer chloride of lime in full doses of linseed oil. If in a state of collapse, give camphor, alcohol, ammonia.

Sulphuric Acid.—Evacuate stomach. Administer solutions of bicarbonate of soda, or magnesia well diluted; give linseed oil and lime water, white of eggs. Later it may be necessary to give opiates.

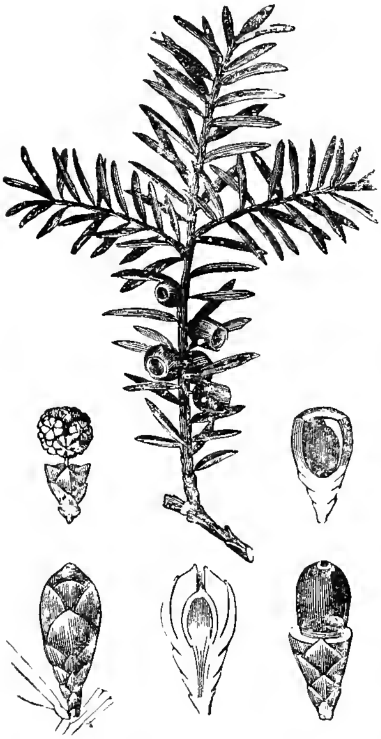

FIG. 152.—TAXUS BACCATA (COMMON YEW).
(From Smith's "Veterinary Hygiene.")

Tartar Emetic.—See Antimony.

Tobacco.—See Nicotine.

Turpentine.—Remove contents from stomach; give a dose of linseed oil and opium, with an abundance of linseed tea. If there are pronounced kidney symptoms, apply a mustard plaster across the loins and administer tannic acid and acetate of lead in gruel and eggs. If there is prostration, give stimulants and hypodermic injections of caffeine.

Veratrine.—Eliminate cause; give respiratory stimulants; artificial respiration; administer carbonates, tannin, and demulcents. Inject morphia if necessary (Landor).

Vetches.—Give a purgative; counteract fermentation by giving antiseptics. Use trocar if necessary. Prescribe stimulants, especially ammonia.

Wormwood Oil.—See Santonin.

Yew.—Perform rumenotomy if the case is seen early. Give linseed oil and treacle in purgative doses, followed by sodium bicarbonate and ammonia. Inject caffeine and brandy subcutaneously.

Zinc Salts.—Give emetics or use the pump. Order carbonate of soda, white of egg, and flax tea at short intervals, and to this may be added treacle or sugar with advantage.

POLL EVIL. *See* **Fistula, Poll.**

POST-PARTUM HÆMORRHAGE.

Serious hæmorrhage from the womb following parturition is very uncommon in animals, if one excludes those cases due to traumatism incidental to parturition which usually take place near the cervix. In the latter case the patient often dies before suitable treatment can be carried out. A careful examination of the uterus by the hand usually succeeds in locating the seat of hæmorrhage. If the placenta is *in situ*, attempts should be made to remove it, after which the womb is packed with several clean towels—in the case of the larger animals—soaked in an antiseptic solution. Bandages answer the purpose well in the smaller animals. Where the exigences of the case permit, both towels and bandages should be boiled for five or ten minutes. These are left in the womb for twenty-four to forty-eight hours, and after removal the insertion for some days of a pessary is necessary. When it is not necessary to pack the womb, rugs rung out in cold water should be placed across the loins, a hypodermic injection of pituitrin given, and repeated if necessary. In those cases where the loss of blood has been great, collapse and death are to be feared, and here the intravenous or subcutaneous and intrarectal injection of normal saline solution is called for. If the heart's action is very weak, diffusible stimulants such as brandy, ammonia, or ether should be administered, or a hypodermic injection of digitalin, and sparteine, or strychnine, and caffeine may be tried. The extremities should be well rubbed, bandaged, and the body clothed. Rich, nutrient foods may be given later on, and the patient placed on a course of iron and vegetable tonics.

POST-PARTUM PARALYSIS.

Paralysis after parturition is most commonly seen in the cow, and very occasionally in the mare. If it is due to nervous derangement consequent upon parturition, a favourable prognosis is justifiable, but if it proceeds from vital injury to the vertebral column or pelvic bones through straining or slipping, the case may be considered hopeless and the animal should be destroyed. It therefore follows that before treatment is undertaken the practitioner should arrive at an accurate diagnosis. Post-partum paresis may run its course in two or three days, or it may be ten, twelve, or fourteen days before the patient is able to stand. The point of first importance to consider, therefore, is that of bedsores, and every means should be adopted to guard against these by placing the animal in a comfortable roomy box with an abundance of *short* bedding, and if the floor is made of stone, a deep layer of sand, sawdust, or moss litter under the straw is to be recommended. The application of knee-caps and hock-pads must not be overlooked. Again, turning the animal from side to side two or three times a day tends to equalize the circulation of the extremities and prevents local pressure, stasis, and bedsores. Slinging should not be attempted in the cow except as a last resort. Ruminants do not as a rule take kindly to slings, and their digestion is severely interfered with if prolonged slinging is carried out. The bowels should be unloaded by a brisk purgative of sodium sulphate and treacle, and the following prescribed:

℞ Pulveris Nucis Vomicæ .. .. .. ʒi.
Potassii Nitratis }
Sodii Bicarbonatis } .. .. .. āā ʒi.
M. Ft. pulv. One powder two or three times a day in flax gruel.

A mustard plaster should be well rubbed into the spine, and repeated in two or three days if necessary, if the skin will tolerate it. If no improvement follows in a few days, ironing the back may be tried. A damp sheet of flannel is placed along the back, and this is ironed with a hot laundry iron. When the moisture becomes evaporated, the sheet is again damped and the ironing repeated. As a rule those cases which respond to treatment are on their legs before the tenth day, although the writer has had patients down for three weeks which made a complete recovery. Such an experience, however, is more the exception than the rule. Nevertheless, it is not a wise policy to give a case up until an extended trial has been given. In the writer's opinion there is a close connecting link between post-partum paralysis and milk fever, and in support of that opinion he has injected those paresis cases on milk-fever lines, and has been often struck with the rapidity with which they have regained their feet. Indeed, this fact has been so much in evidence that it is advisable to treat those cases by injecting the udder.

PRICKLY HEAT.

In mild cases a laxative and cooling diet, with salines and diuretics, prove efficacious. Cool stabling should be provided as far as possible. In severe cases a course of alterative medicine, followed by tonics, is indicated. The application of a lotion containing camphor dissolved in spirit allays the irritation. A change of environment may be necessary. In the hot season special attention to grooming is essential; massage of the parts bearing saddlery and harness is advisable. The bites of insects increase the irritation, and should be guarded against.—*G. K. Walker.*

PROLAPSE. *See* Eversion.

PROSTATE, DISEASES OF.

Inflammation.—This condition is occasionally seen in the horse and bull, but is more often noted in full-blooded, pampered house-dogs. The bowels should be unloaded in the larger animals by aloes and calomel, in the dog by calomel followed by a saline. The diet must be light and non-stimulating, and in the case of the dog starchy foods and red meat withheld. Warm soapy enemas give relief when there is acute pain. Hip-baths are also useful in canine cases. When the urine is retained the catheter must be used, but care should be exercised in doing so. Resolution may set in and the prostate regain its normal condition, or the inflammatory process may lead to the formation of pus, a fluctuating swelling being detected by inserting the fingers or hand, as the case may be, into the rectum, while swelling may also be detected in the perineum itself. Evacuating the pus is most essential at the earliest possible moment, owing to the danger of its bursting into the peritoneum. The perineum is incised at the side of the anus, and the encountered tissue carefully cut through until pus is reached. The cavity is gently curetted and then irrigated with proflavine solution, after which it is lightly packed with gauze soaked in proflavine and citrate of soda solution.

This dressing should be repeated daily. If pus continues still to flow for several days, the cavity and sinus are again curetted and packed with B.I.P.P. During the course of treatment it is most important to see that the bowels are kept freely open, and for this purpose in the dog there is no better agent than medicinal paraffin.

Hypertrophy.—The inflammatory condition may run a slow insidious course, ending in permanent enlargement of the organ, with the consequent difficulty in passing urine, in which case an extended trial of catheterization may be tried, beginning with the smaller-calibred catheter and working upwards to the largest size capable of being borne. In the meantime the bowels should be kept regulated and the patient put on a course of alterative doses of calomel and potassium iodide. Restricted diet and exercise should also be ordered. If this does not effect relief, castration is well worthy of a trial. This operation has in some instances given good results, while in others it has afforded no benefit.

Malignant Growth.—Here treatment is of no avail.

PRURITUS.

Troublesome itching of the skin, often without apparent reason, is occasionally seen in animals, especially the horse. A change of diet should be ordered and a dose of physic given, followed by a course of sedative antiseptic treatment, the best of which the writer has found is a combination of arsenic, bromide of potassium, and carbolic acid.

Local irritation may be reduced by cooling sedative lotion. The following usually gives excellent results:

℞	Acidi Hydrocyanici Dil.	ʒiii.
	Liquoris Plumbi Subacetatis	ʒv.
	Glycerini	℥i.
	Aquæ	℥xx.

M. Ft. lotio. To be applied night and morning after cleansing the skin with hot water and soft soap.

If this does not bring about relief, carbolic acid 3 drams, carbonate of potash 4 drams, water 20 ounces, should be tried.

Pruritus Ani cum Vulvæ.—Acute irritation in the region of the anus and vulvæ is often most troublesome to the patient and the attendant. It may be due to the presence of dirt in the horse, caused by the crupper, or hæmorrhoids, or worms. Obviously, therefore, treatment consists in ascertaining the cause and effecting its removal. To reduce the irritation white lotion may be applied, added to which is tincture of opium 1 to 20 or carbolic acid 1 to 40. If these do not effect a cure, the following ointment may be used:

℞	Bismuthi Subnitratis Acidi Borici	āā ʒi.
	Creasoti	♏xx.
	Hydrargyri Subchloridi	ʒii.
	Vaselini	q.s. ad ℥ii.

M. Ft. ung. Apply night and morning.

PSAMMOMA.

When brain psammoma are diagnosed, palliative measures can only be adopted by resting the animal, lowering the blood-pressure by non-stimulating diet, and occasional doses of aloes, followed later by alterative doses of calomel and potassium iodide. These neoplasms being slow in growth, the brain takes on an accommodation rôle, so much so, in fact, that the animal may live and work for years without manifesting serious clinical data. Their presence, however, is often revealed after very strenuous work such as hunting, racing, or heavy draught. This is doubtless due to an active cerebral congestion setting in as the result of the growth or growths causing mechanical circulatory interference.

The writer had a case under observation for ten years which every summer gave trouble, the acute conditions responding to bleeding, low diet, and the treatment indicated above. In addition, the patient was kept indoors by day and turned out to grass at night, strong sunlight aggravating the condition. This animal died eventually from an attack of meningitis, post-mortem revealing a neoplasm in each hemisphere.

PTYALISM.

Salivation may be seen in any animal, and before treatment can be undertaken the cause must be found and, where possible, removed. If it is due to poisoning, the poison should be ascertained and appropriate treatment adopted. Local mouth conditions may be the root cause; thus actinomycosis in cattle, a foreign body such as a piece of wood or leather fixed in the roof of the mouth, or a bone in the case of the dog and cat. It may arise from acute inflammation of the oral mucosæ or even sore throat, as is sometimes seen in strangles. In horses irregularities of the teeth should not be overlooked as a probable cause. In all local mouth conditions an aperient should be given and antiseptic mouth washes applied. In some cases, acute inflammation of the salivary glands is the cause, in which case treatment is directed to that condition. If the salivation is persistent, belladonna should be tried or hypodermic injections of atropine given.

PUERPERAL SEPSIS.

This condition embraces a considerable number of diseases, some of which have been already touched upon. At, or soon after, parturition, pathogenic bacteria gain access to the generative organs. These organisms are streptococci, staphylococci, diplococci, *B. coli communis*.

Bacterial puerperal infection may be autogenetic—that is to say, the organisms are present in the generative organs prior to or at parturition; heterogenetic, when the bacteria are introduced from without by the hands or instruments of the obstetrician or by retention of the placenta. Clearly, therefore, treatment falls under two heads—curative and prophylactic.

Curative.—In veterinary practice it is not always economically practicable to ascertain the type or types of organisms causing the condition, and yet this is of *prima facie* importance when dealing with curative measures. To do this a careful bacteriological examination of the uterine content is necessary. Nevertheless, it must be pointed out there is no reason why a practitioner with a $\frac{1}{12}$ 0·1 lens and a good stain such as carbo-gentian violet, or, better still, Gram's, should not take a swab from the cervix or womb to make a smear and note the bacteria present. The bacteria may be located on the uterine mucosæ, they may have extended through the wall to the peritoneum—when the case is a serious and often fatal one—or they may have gained access to the lymph or blood-stream through a uterine abrasion or bruise, constituting general septicæmia. If the case is seen early, enquiries should be made as to the complete removal of the after-birth, and if any is retained it should be removed forthwith. The hand, after washing, is smeared with carbolic oil and passed into the vagina in large animals. If the os is nearly closed, it must be dilated first with one finger and then with two, and lastly with all the fingers cone-shaped. The hand once in the womb, all fluid should be scooped out, any decomposing cotyledons removed, and the whole mucosæ gently scraped with the finger-nails and the debris removed. Some authorities recommend douching; this the writer seldom does, preferring to scoop out the fluid and insert several antiseptic osmotic pessaries, consisting of proflavine, boric acid, and citrate of soda, repeated daily until sepsis has been reduced. In the smaller animals such as the bitch, it is good practice to remove the uterus surgically (see Hysterectomy).

Drug Therapy.—The eliminative organs should be kept well flushed. Thus the bowels are unloaded by a laxative, especially a saline, at the outset. For the kidneys and skin salicylic acid, potassium nitrate, liquor ammonium acetate, turpentine, and alcohol are indicated. If the heart is weak, normal saline solution, digitalin and sparteine, strychnine, or caffeine hypodermically, are advised. The diet should be light and digestible throughout the illness, the body properly clothed, and the surroundings hygienic.

Serum Therapy.—In the case of all valuable animals, when the infection is acute, the first thing the practitioner should do is to inject a full dose of polyvalent antistreptococcal, antistaphylococcal, and anti-*B. coli* serum, and repeat it in six to twelve hours.

Vaccine Therapy.—While the serum is being injected an autogenous vaccine should be in the process of preparing, and a dose injected as soon as possible. It may be pointed out here that cases which run a subacute course will derive more benefit from vaccine therapy than the acute cases. Further, the more acute the case the smaller the dose should be, and the oftener it should be given; whereas the subacute cases should be subject to larger doses and at longer intervals.*

Prophylaxis.—All animals should bring forth their young in healthy surroundings. The after-birth must not be retained beyond a reasonable period. This varies according to the species of animal. In removing it artificially every sterile precaution should be taken, and the greatest care exercised to see that none is left *in utero*. After removal, antiseptic pessaries freely used are advised.

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* For further details the reader is referred to the author's "Clinical Bacteriology and Vaccine Therapy."

If delivery is not normal and artificial means are required to bring it about, it is the first duty of the obstetrician to see that his instruments, slips, and hands are sterile, and kept so, as far as possible throughout the operation. This object can be attained by having a large vessel containing an antiseptic solution at hand, into which instruments can be dropped when not in use. As soon as delivery has taken place the vulva, vagina, and womb are anointed with carbolized oil and an antiseptic pessary is inserted. If the case is a critical one, these pessaries should be used daily for some days. If during delivery abrasions, uterine or vaginal, have occurred, these must have immediate attention by dressing with whisky and water —equal parts—to which a little common salt has been added. The patient's general comfort should be attended to, and on the first sign of any constitutional disturbance arising suitable steps must be taken to thwart its progress.

PUMICED SOLE.

Dropped sole in the horse is usually seen as a sequel to laminitis, and is often a source of considerable trouble, especially if the horn underlying the displaced toe portion of the pedal bone has become disintegrated, exposing the sensitive laminæ. In this condition the sole invariably forms a bearing surface even with the shoe on. The first step towards treatment must be directed to removing this, either by putting on a very thick webbed shoe or a round shoe deeply dished out like a saucer, with a bearing only on the wall and the posterior bulbs of the frog. Thus shod, an animal may be turned out to grass if the ground is hard; if soft the soil will "cake" in the sole and produce pressure on the affected part. Loose horn should be pared clean away, and the sole cleaned and dressed daily with tar; while to stimulate the growth of horn, a blister is repeatedly applied to the coronet. When suppuration is present, the foot or feet are treated by antiseptic poultices for some days before the above treatment is adopted.

PUNCTURE.

Abdomen.—See Paracentesis, Abdominal.

Bladder.—When the bladder has become so distended with urine, usually as the result of urethral obstruction due to a calculus or pressure of the urethra from without by neoplasms or enlarged prostate, to prevent rupture of the organ, it is sometimes imperative to tap the bladder. Various routes are practicable according to the patient; in the case of the horse and ox the bladder is reached through the rectum or by the perineum. As it is impossible to cast an animal with a distended bladder, tapping must be done standing. The ox is secured by a pair of bulldogs; the horse is twitched and a fore leg held up. If the rectal route is adopted, the rectum is emptied of all fæces and thoroughly flushed with an antiseptic solution. A long, slightly curved trocar and canula (sterile) is then carried into the rectum by the right hand, previously disinfected. The distended bladder will be easily felt pushing up the rectal floor. The instrument is thrust through the rectal wall into the bladder in a forward and downward direction, the trocar withdrawn, and the urine drained off. The drawback to this route, of course, is the danger of sepsis. By the perineal route the skin at the side of the anus is sterilized and incised; a straight, long, small-calibred trocar and canula is carefully pushed through the tissues in a forward direction for some distance and the trocar removed. If the bladder has not been punctured, no flow will take place. The trocar is then again inserted and the instrument thrust further forward, and if the bladder has been reached the urine will flow freely. As a rule, if the organ is greatly distended, there will be no difficulty in reaching it. The canula may be left *in situ* for several days to allow the urine to drain away if necessary.

In the dog and cat puncture takes place through the suprapubic route. The patient is laid on its side, the skin painted in front of the pelvis, and a fine sterile trocar and canula is passed through the abdominal wall into the bladder and the urine withdrawn.

Puncturing the bladder is obviously a palliative and emergency measure, giving only temporary relief and not effecting a removal of the cause; but when a bladder is so distended to bursting point, if tapping is not adopted, death will follow rupture of the organ, the wall of which can only withstand a given degree of pressure from within.

Bowel.—Tympany of the bowel is by no means uncommon in the horse, and where there is considerable gas-accumulation puncture is necessary for the threefold reason—*i.e.*, (1) it prevents the risk of rupture, (2) suffocation, (3) it facilitates the action of the physic, particularly the purgatives. Here the operation is performed in the upper *right* flank at the most tympanitic part, or at a point equidistant between the last rib, external angle of the ilium, and the lateral processes of the lumbar vertebræ. The writer prefers a long, 4 to 6 inch, slightly curved trocar. The instrument, being curved, retains a better hold on the bowel wall as the viscus recedes through the escape of gas.

The patient is twitched, the front leg is picked up, the hair clipped or shaved at the seat of operation, the skin painted with tincture of iodine and then incised, and the instrument forced into the bowel with a thrust in a downward and slightly inward direction. On removing the trocar the gas will freely escape. If the canula becomes blocked, a stilette should be inserted to clear the tube. It is not advisable to inject antiseptics here direct into the bowel, owing to the small possibility that the gut has receded from the point of the instrument, in which case the antiseptic would find its way into the peritoneum, with disastrous results. If the gas should reaccumulate re-tapping is necessary, but it is preferable to operate at a fresh point. No after-treatment save painting the wound with iodine is necessary.

Chest.—See Paracentesis, Thoracic.

Heart Sac.—See Paracentesis, Pericardial.

Rumen.—Puncturing the rumen in cattle or sheep is a very simple operation. If the organ is greatly distended the site chosen is usually the most prominent point, but, correctly speaking, it is a point equidistant between the last rib, the external angle of the ilium, and the lateral processes of the lumbar vertebræ. If there is much succulent food as well as gas in the rumen, the canula will often become blocked with ingesta, but by reinserting the trocar this is easily cleared. In those cases of persistent reaccumulation of gas it is advisable to suture the flange of the canula to the skin, and keep it *in situ* for twelve or twenty-four hours. Antifermentative agents may also be injected direct into the rumen through the canula.

Spinal Membranes.—See Lumbar Puncture.

Thorax.—See Paracentesis, Thoracic.

PURPURA HÆMORRHAGICA.

This disease usually follows a low type of influenza or strangles, and is due to the action of specific bacteria or their toxins, or both. Beyond this we know little as regards its pathology. Treatment must therefore be somewhat empirical. It seems rather strange that in an outbreak of influenza occurring in a stable and apparently running a normal course, one or two animals should suddenly develop purpura, there being as a rule no clinical indication that the affected animal has received a more potent dose of the specific poison than the others. It would therefore appear that it is not so much the virulence of the infection as the *idiosyncrasy* of the patient that lays it open to develop purpura. The patient should be placed in a comfortable box, the sanitary arrangement leaving nothing to be desired, the body clothed, and legs bandaged. The diet must be light, laxative, and nutritious. A small dose of linseed oil should be given. Purgatives are contra-indicated, owing to the danger of intestinal and kidney hæmorrhage. A full dose of antistreptococcal serum is then injected, and repeated every twelve or twenty-four hours according to symptoms; even normal horse serum tends to increase coagulation of the blood.

Coagulability also should be increased by giving full doses of lactate of calcium—½ to 1 ounce three times a day. Lime water may also be given in the drinking water. The writer has obtained good results from the intratracheal injection of Lugol's solution*—½ to 1 ounce daily in some cases; while in others no benefit has been noted. If the temperature is high salicylic acid is indicated, combined with chlorate of potash. The much lauded astringents such as tannic acid, alum, and lead salts, have given the writer no good results, nor have those styptics, ergot or adrenalin. Probably the two most valuable agents next to calcium are liquor arsenicalis and liquor ferri perchloridi given in eggs, milk, and linseed tea. Turpentine is highly recommended by some authorities. When the heart's action is weak, digitalis, strychnine, and sparteine arc advised. Normal saline solution injections are also useful in eliminating toxins.

When cutaneous swellings are considerable the parts should be fomented with cold water and salt, and white lotion applied. Upon no account must the swelling be scarified, owing to the after-danger of deep sloughing and slow healing. If symptoms of dyspnœa set in, tracheotomy should be performed.

When convalescence takes place, the animal should be put on a course of tonics—iron and vegetables.

PYÆMIA. *See* Septicæmia.

PYOMETRA.

This is usually a chronic condition most commonly seen in the cow, occasionally in the bitch, culminating in a general constitutional unthriftiness, with a mucopurulent discharge from the vulva. The os uteri should be dilated, considerable force being often required. If digital means fail, a blunt-pointed bistoury is carried into the vaginal canal, passed through the os, and the cervix cut on its upper lateral third. The fingers now, after patient rotation, will usually succeed in enlarging the opening, but if this fails another incision should be made on the opposite upper third and an entrance again effected by the hand. With the hand in the womb the uterine wall is scraped with the fingers, or a small spoon may be used, the pus removed, and a warm douche—temperature 108° to 110° F.—of normal saline solution and boric acid given. The fluid is then removed and a pessary inserted. This operation may have to be repeated several times, and the patient put on a course of tonics and cod-liver oil, and plenty of rich food and fresh air.

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* 1 part iodine, 5 parts potassium iodide, 200 parts water (dist.).

QUARTER EVIL. *See* **Black-Quarter.**

" QUIDDING."

The ejection of partly masticated food from the mouth is seen most commonly in the horse, and occasionally in the ox. The condition is due to a variety of causes, and before treatment is undertaken these must be ascertained. The lodgment of foreign bodies in the mouth, injuries to or diseases of the tongue, irregularities of the teeth, are a few of the root causes, the correction of which usually brings about recovery. The treatment of these will be found under their respective heads.

QUITTOR.

This is a chronic inflammatory and necrotic condition of the lateral cartilage due to the direct action of pus-producing organisms causing sinus formations. Various methods of treatment have been from time to time advocated to cure this troublesome affection. Like all other suppurative conditions tending to take on a chronic disposition, the stage at which the disease exists and the amount of vital damage must have an important bearing upon the practitioner's line of action. Thus, if the soft structures surrounding the cartilage are inflamed and the parachondrium only slightly involved, much good, and maybe eventual recovery, will follow palliative measures; on the other hand, if necrotic patches exist in the cartilage itself it must be remembered that, owing to its low vascularity, a separating of the dead from the living process by Nature's method is practically impossible, and here radical measures are essential. Treatment therefore falls under two heads—*i.e.*, simple and radical.

In the former case the shoe should be removed, the wall of the hoof immediately under the seat of quittor rasped down to relieve tension by allowing expansion, and the whole foot placed in a warm antiseptic foot-bath with a temperature about 110° F., and repeated two or three times a day. The best antiseptic is a weak solution of Lysol to which is added common salt, the strength being double to that of normal saline solution —*i.e.*, sixteen teaspoonfuls to the gallon. While the foot is in the bath an elastic bandage or tourniquet may also be applied just under the knee (Bier's treatment, which see). If there are signs of pus formation it should be evacuated forthwith by lancing, the cavity lightly curetted, and irrigated with proflavine or hypochlorites. At this stage the writer has in some cases obtained excellent results by the daily insertion into the sinuses of equal parts of granulated sugar, citrate of soda, and soft soap made into an ointment, after which the whole quittor area is smeared with the dressing and kept in position by bandaging. This ointment forms an excellent " drawing " agent. If under this treatment the lameness disappears and suppuration ceases, a shoe should be lightly tacked on, a mercurial blister applied, and the animal turned out to grass to complete the cure. If a corn is the root cause of the trouble, it is unnecessary to add it should receive first attention.

In severe cases, where extensive necrosis of the cartilage has taken place, the injection of such caustic solutions as carbolic acid, corrosive sublimate, chloride of zinc by means of a quittor syringe have been advocated from early days, and even some surgeons to-day insert these agents into the sinuses in their pure form; others, again, use the actual cautery, inserting the point to the end of the sinus or sinuses, while some still recommend setons.

In addition to the foregoing treatment, vaccine therapy is well worth trying, but it should be autogenic and the doses large. Further, the vaccine attenuated for the first two or three doses should later on be replaced by virulent antigens.

If all these methods fail, surgical interference is called for, consisting of partial or complete extirpation of the cartilage. If the former is decided upon, it should be pointed out, however, that partial removal is no guarantee for a cure, and as the preparation for the one is similar to that for the other, it appears to be sounder surgery to remove the whole of the cartilage.

Various methods of operating with the view of completely removing the lateral cartilage have been advocated from time to time.

The animal is cast on the side, so that the diseased quarter is uppermost; the affected limb is then firmly fixed to the opposite leg, and the horn rasped almost to the sensitive laminæ immediately below the diseased area. An elastic bandage is applied from the foot to the knee and a tourniquet adjusted, so that the operation may be completely bloodless. All hair having been removed from the seat of operation, the skin is scrubbed with Lysol water, dried, and painted with tincture of iodine. The patient is then chloroformed; Frick recommends an incision be made with a curved quittor knife along the lower border of the coronary band and extending from the anterior to the posterior aspects of the cartilage. The coronary band and skin are then separated from the underlying cartilage by a knife slightly convex in shape, the convexity, of course, being directed outwards. In carrying out this process, care must be taken not to sever the coronary band; the knife should therefore be held firmly in the hand and gripped short. The band and skin are now drawn upwards and outwards by means of retractors, exposing thereby the cartilage. A single-edged quittor knife is now passed carefully upwards between the skin and cartilage to the posterior border of the latter, and a half-turn given to lift the cartilage from its bed. The knife, in this position, is then drawn outwards, severing the posterior half of the cartilage. The toe is now extended and the anterior portion removed. Should any portion of the cartilage remain, or centres of unhealthy tissue, often indicated by a livid appearance, be present, these should be carefully curetted and the whole wound surface lightly smeared with a little common salt. It is then irrigated with a solution of proflavine (1:2,000). The skin and band are placed in their proper position, and the surface is painted with tincture of iodine. The whole wound is now covered with a pad of carbolized gauze, and kept in position by a bandage fairly firmly applied to prevent hæmorrhage after removal of the tourniquet. The foot should then be placed in a canvas bag to keep it dry and clean. In about forty-eight hours the dressing is removed and the wound irrigated with proflavine in normal saline solution, covered with sterile gauze, and bandaged. If the wound is sterile it should not be disturbed for three or five days. As soon as the coronary band has become adherent bandages may be left off, and the whole surface smeared occasionally with Stockholm tar to keep out dirt.

Bayer's operation is a modification of the above, but in this case a crescent-shaped piece of horn, under which lies the lateral cartilage, is removed. He then makes incisions through the sensitive structures, dividing the coronary band and extending them to the upper margin of the lateral cartilage. The resultant flap is now carefully dissected from the cartilage, which completely comes into view, and is totally or partially removed as may be necessary. The wound is now dressed, the flap brought into position, the edges sutured, the surface padded with gauze, and bandaged. If complete asepsis is maintained, the dressing may be left for ten or twelve days, after which the bandages are removed and the wound redressed.

Perrier's operation consists of removal of the lateral cartilage by means of a crescent-shaped aperture situated above the coronary band. The drawback here is the production of a pocket at the floor of the seat of operation thwarting drainage, but this may be overcome by inserting a drainage tube and bringing it out through the wall of the hoof. Irrespective of the successful results obtained by many surgeons, there appears to be a growing tendency among practitioners to discard surgical methods.

This may be due to the fact that all types of quittor in recent years, independent of their condition, were operated upon indiscriminately, thereby bringing surgical therapy into disfavour in many quarters. In the writer's opinion, operations for quittor should not be undertaken lightly, but only when all other more moderate methods fail.

RACHITIS. *See* Bone, Diseases of.

RANULA.

Cystic accumulation of mucoid material at the side and root of the tongue may be seen in the horse, ox, dog, and cat. In the ox it is occasionally associated with actinomycosis. The tongue having been withdrawn and held to the side opposite to that of the cyst, a deep incision is made into the whole length of the growth, a portion from each edge is removed by blunt-pointed curved scissors, and the surface curetted. The wound is then gently rubbed with common salt. Subsequent treatment consists of painting daily with tincture of iodine. The patient should be placed upon a sloppy or liquid diet for some days.

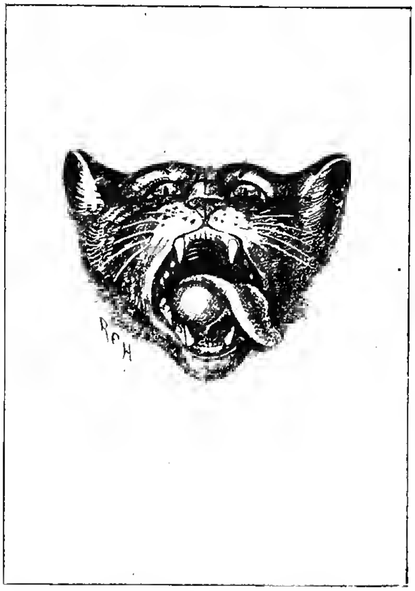

Fig. 153.—Cat with Ranula.
(Hobday's "Canine and Feline Surgery.")

RECTUM, DISEASES OF.

Atresia.—See Atresia.

Dilatation.—If this condition is of long standing, treatment is of little avail. When it is of recent date, the animal should be placed on a liquid or sloppy laxative diet combined with laxative medicines repeated often. Enemas should be administered often to prevent the lodgment of fæces, and such astringents as tannin or sulphate of copper in weak solution may be injected daily. A course of tonics such as iron and nux vomica are also worthy of a trial.

Impaction.—This condition may arise from a variety of causes, such as dilatation and thinning of the rectal wall, paralysis of the wall, paraplegia, the presence of foreign bodies, neoplasms, and constipation.

The fæces must be made as pultaceous as possible by giving oily laxatives, a laxative dietary, and enemas. In addition, the patient should be placed upon a course of tonics, including nux vomica or its alkaloid; strychnine injected subcutaneously.

Inflammation.—Remove fæces from the rectum by soapy enemas to which has been added strained linseed and boric acid, and if there is much pain tincture of opium. Administer an oily laxative, and repeat if necessary. In addition, an occasional enema of carron oil (equal parts of linseed oil and lime water) has a very soothing influence upon the mucosæ, and counteracts the irritating effect of passing fæces. If the inflammatory condition is traumatic, treatment accordingly is indicated.

Injuries.—These are either caused from without by the malicious insertion of sticks, the accidental insertion of the penis in copulation, the animal rubbing against a projecting obstacle; or within by hard fæcal concretions, or in the case of the dog and cat by the passage of ingested pieces of bone. When the rectal wall has been pierced, treatment is usually of no avail, for septic peritonitis often sets in and ends in death. Wounds in the mucosæ are treated by antiseptic enemas, administering laxatives, and ordering a restricted laxative diet. Consequent upon cicatrization, there is a tendency in the case of large wounds to stricture. To obviate this, in large animals the hand should be inserted often and the membrane stretched, and in small animals rectal bougies are advised. A tallow candle often serves the same purpose.

Paralysis.—As the origin of this condition is usually in the spinal cord itself, treatment is often useless. In the smaller animals a course of galvanism may be tried combined with hypodermic injections of strychnine.

Prolapse.—Prolapsus recti is most commonly seen in the horse, dog, and pig. If it is recent, a mild astringent such as alum lotion, to which is added a little cocaine, should be applied to the mucous membrane, and by steady taxis the organ is returned with ease. After returning the bowel, which is usually an easy matter unless it has been out long and become œdematous, in which case a piece of linen is placed round it and steady pressure with the hands applied to expel the effusions, it is most important that the anterior folds of the rectum are obliterated by stretching. In the horse this is done by inserting the hand and arm well lubricated with carbolized oil as far into the bowel as possible; for the smaller animals a long tallow candle may be used to serve the same purpose. The trouble these cases give is their great liability to recur. Such risks are reduced by keeping the animal on a laxative diet—bran, oats, linseed, green foods, and roots for the horse; oatmeal and brown bread for the dog; bran, sharps, roots, and grass for the pig. The bowels should be kept open by moderate doses of linseed oil, and medicinal paraffin or salad oil for the smaller animals. As a precautionary measure, after returning the prolapse, a tobacco-pouch suture may be inserted round the anus, or the tail may be tied with tape fixed to a strap round the chest, so that it remains closely applied to the anal region. The suture must be loosened and the tail freed two or three times a day to admit of the passage of fæces. If, despite these efforts, the prolapse keeps on recurring, more radical measures must be adopted.

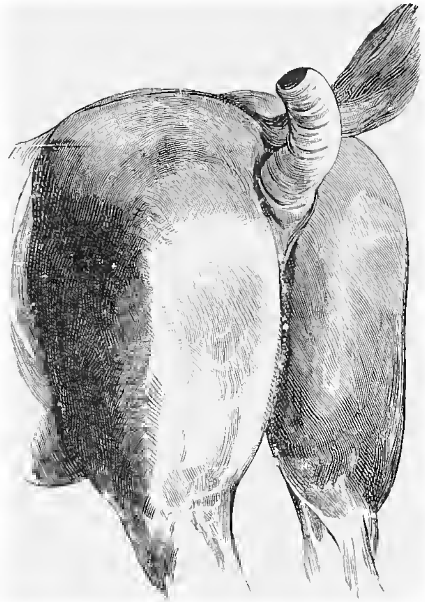

FIG. 154.—PROLAPSUS RECTI WITH INVAGINATION: HORSE.
Dollar's "Regional Surgery."

1. Four equidistant grooves should be made by the thermo-cautery through the mucosæ extending from the edge of the anus to the free end of the protrusion, after which the organ is lubricated with carbolized oil, gently returned, and the measures already indicated to prevent recurrence carried out.

2. *Gersuny's Wax Operation.*—This operation is recommended by Hobday in his "Surgical Diseases of the Dog and Cat," who speaks very highly of the results obtained. Hobday gives the following instructions, which are quoted *in extenso:*

"The patient is placed on the operating table in the abdominal position and chloroformed, the lower bowel having been washed out by an antiseptic enema (warm boric acid or chemical solution). The operator then allows the rectum to be prolapsed as far as it will come down (even assisting in the process with the finger) on to a sterilized mackintosh cloth or piece of jaconet, when it is carefully cleansed. The wax to be used (a special variety of white paraffin wax melting at 105° F., properly sterilized, and put up in convenient-sized wide-mouthed bottles) has previously been melted by placing it in a bowl of hot water, and is now drawn up into a sterilized syringe. A thermometer is placed in the water to guard against scalding, as the heat at which it should actually be injected is just above that at which the wax melts. A fold of the mucous membrane of the bowel is picked up between the finger and thumb in a longitudinal direction, the needle is inserted, and the wax slowly injected. During the process, to prevent clogging in the needle, an assistant covers this with a hot swab; as soon as the injection is completed this is changed to ice-cold water, which is poured over the pillar of wax thus formed in order to make it 'set.'

"The process is repeated two, three, or perhaps four times, pillars of wax being formed on opposite sides of the bowel in such a way that (when returned), if straining takes place, these approach one another and mechanically prevent eversion. After as much has been inserted as is deemed sufficient to effect the required purpose, the still prolapsed and everted gut is carefully manipulated between the fingers and gradually returned, the middle finger being inserted to adjust the mucosæ. In doing this operation care must be taken to puncture the mucous membrane in as few places as possible, the wax having an unpleasant habit of escaping freely through the tiniest hole. The operator, too, must always be prepared to guide the fluid wax in the proper direction and to mould it into the required shape."

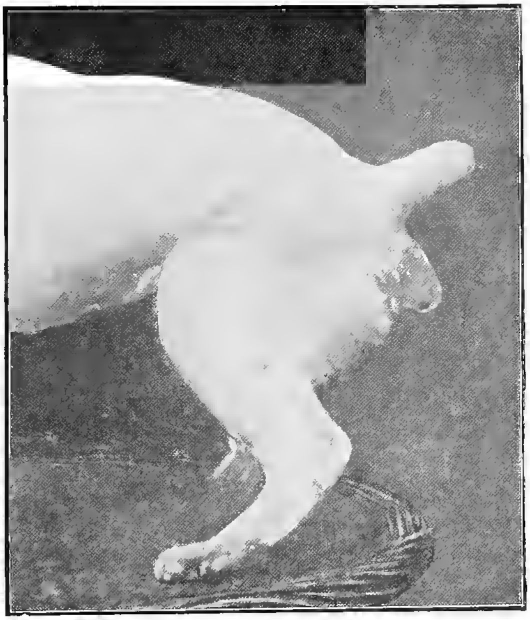

FIG. 155.—PROLAPSE OF THE RECTUM: DOG.

3. *Mummery's Operation** consists of sterilizing the skin between the anus and the tail, making a horizontal incision 1 to 2 inches in the horse, ¼ to ½ inch in the dog, the tail being forcibly drawn upwards and forwards to make the skin tense. The tissue in the pelvi-rectal space is then broken down by the finger previously painted with iodine, or by a blunt probe, or both, the depth varying in respective-sized animals. On this point the operator must be the best judge, but on no account should he go so far as to penetrate into the peritoneal reflection. Suffice it, therefore, to point out that in the horse usually about 4 inches of the posterior portion of the rectum is free from peritoneal covering, and in the dog ½ to 1 inch. The cavity thus made is then lightly packed with sterile gauze, and the edges of the skin are drawn together with one or two sutures. The gauze is removed daily and the cavity repacked until cicatrization takes place. The curative objective of the operation consists in the formation of firm adhesions between the superior wall of the rectum and the inferior surface of the vertebræ.

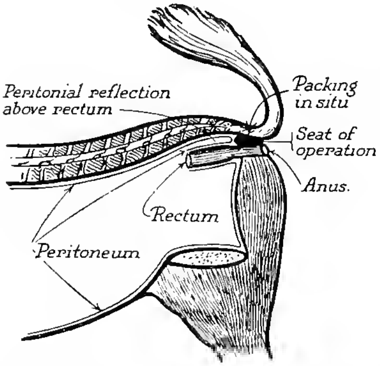

FIG. 156.—SHOWING MODIFICATION OF MUMMERY'S OPERATION FOR PROLAPSUS RECTI.

4. *Proctopexia.*—This operation consists of performing laparotomy (which see), drawing the rectum well forwards, and suturing the mesentery to the abdominal muscle by several catgut sutures, and the abdomen closed. Needless to add, this operation is only performed when other methods have failed.

5. *Excision.*—This is always a troublesome proceeding, and not altogether free from danger. The horse is cast and chloroformed (the dog may be operated upon under a local or general anæsthetic), the rectum and posterior bowels washed out with a mild antiseptic, and the mucous membrane of the everted portion and the anus dressed with an antiseptic. For the horse Dollar recommends multiple sutures, presumably strong catgut or kangaroo tendon. With a sharp lancet he cuts through the upper half of the rectum close to the anus; the severed edges close to the anal ring are then sutured by close-fitting interrupted sutures. The suture material not being cut off is given to an assistant to hold, so that the bowel is prevented from receding into the pelvis. The lower

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* The writer has been compelled to modify somewhat Mummery's operation to apply to comparative surgery, and has succeeded in bringing about recovery where other methods have failed.

half is then severed in a similar way, sutured, superfluous ligature material cut, and the stump returned.

Another method which the same author advises consists of passing two needles armed with suture material through the rectum close to the anus crosswise. The bowel is cut through ½ to ¾ inch behind the sutures. The sutures are then drawn through the intestinal opening and cut in the centre. This gives four independent threads which, when tied, make four distinct sutures.

If the union of the edges is incomplete, a suture may be placed between each stitch, making then in all eight sutures, and the bowel returned. Hobday recommends, in the dog, passing a sterile sound into the lumen of the everted bowel, inserting interrupted sutures through the rectal wall all round to the sound and close to the anal skin, with the object of preventing the bowel receding when it is excised, which is the next step. Half the rectum is severed at a time, and the cut edges sutured where it is necessary, the remaining half being treated in a similar manner.

After treatment the diet for the horse should consist of sloppy bran mashes, grass, and roots for three or five days; the dog should be placed on a milk diet. For the horse a little linseed oil in the food keeps the bowels pultaceous, and for the dog medicinal paraffin daily is advised. The daily injection of a little weak carbolized oil into the rectum for a few days facilitates the healing process.

Stenosis.—When the condition is a recent one, much good may be done by dilating the rectal wall in the large animals with the hand smeared by a lubricant, while in the smaller animals bougies may be used. A tallow candle is also excellent. The fæces must be kept as pultaceous as possible by giving laxatives and ordering a laxative diet.

Tumours.—Malignant as well as benign neoplasms are occasionally met with in the rectum. If they are pedunculated, their removal by the ecraseur is usually easy. When they are sessile and immediately under the mucosæ, by cutting through the membrane and by digital manipulation they can often be enucleated. If they are situated in the floor of the rectum the mucous membrane should be sutured afterwards, failing which a receptacle for fæces will form and the case end in failure.

After the removal of rectal tumours, antiseptic enemas should be used often and the bowels kept freely open by laxatives and a suitable diet. When they are multiple and malignant, the animal should be destroyed.

REDWATER. *See also* Piroplasmosis.

Redwater in cattle, at least in some districts in England, is not so common as it used to be, and the writer can recall a district in Somerset where to put *fresh* cattle at certain seasons meant the loss of 70 per cent., whereas now it is almost unheard of. The disease appears to have lost much of its virulence of late years. As the alimentary system soon reaches a state of stasis, a brisk purgative is called for at the outset. Sulphate of sodium, common salt, and treacle are the best combination, and a copious supply of water is allowed. If the bowels are very obstinate, a hypodermic injection of strychnine and pilocarpine may be necessary, while barium chloride may be given by the mouth. A variety of drugs have been from time to time advocated to counteract the disintegration of the hæmoglobin, such as tannic acid, sulphuric acid, iron, potash, soda salts and quinine, but it is certain none of them exerts any specific action on the piroplasma, although it must be confessed they act as tonics, correctives, eliminatives, and such-like. Probably the best combination for these purposes, however, is turpentine and perchloride of iron given three times a day in flax gruel and eggs, while the subcutaneous injection of normal saline solution should not be overlooked. Of recent years Nuttall has advocated trypan blue, which does appear, from the experience of others, to exercise a specific action upon the piroplasma; 100 c.c. of a 1 per cent. solution is injected into the jugular vein. One injection is usually effectual, but a second may have to be occasionally given.

Diet.—This must always be of a laxative nature, and if the weather is mild animals do just as well out of doors as in. Bran, oats, linseed, with roots when in season, form an ideal dietary. Steamed hay, to which has been added a little common salt, is digestible and often relished. When the animals are at grass, a change of pasture, especially from low-lying to high ground, is advisable.

Prophylaxis.—The first and most important step is the destruction of the piroplasma carrier—*i.e.*, the tick. This is not altogether an easy matter. When certain pastures are known from experience to be particularly prone to redwater, cultivation should be advocated; of course, this is not always practicable, as, for example, in marsh land, which will not stand ploughing. Top dressing the soil with salt and lime offers limited benefits. Mowing the rough grass, and burning it, tends to root out the tick nests. Dipping cattle with fairly strong dips kills out the "lodger" tick, but offers little security against further reinfection. For this means, therefore, to be effectual, dipping must be performed often, and in the case of a large number of animals this is no light matter and is often impracticable.

Finally, keeping cattle from infected pastures for a period of eighteen months to two years effectually gets rid of the disease-producing propensities of the tick, according to some authorities.

RETENTION (URINE).

The accumulation of urine in the urinary bladder may be due to a variety of causes, which must be clearly distinguished from *suppression* of urine. It is seen in such constitutional disorders as milk fever, paralysis—spinal and cerebral—or it may arise from primary paralysis of the bladder itself. The flow of urine may also be prevented by pressure on the neck of the bladder by neoplasms or enlarged prostate, or by the presence of calculi or growths in the urethra. It is therefore obvious, before treatment can be undertaken, that the cause must be ascertained and, when possible, removed. The procedure to be adopted will be found under their respective heads throughout the text.

RETICULITIS.

Inflammation of the reticulum probably never exists as a primary condition except in those cases of traumatic origin. When the rumen becomes deeply inflamed extension usually takes place to the reticulum, and the treatment of the one is embodied in the other; as this will be more fully considered under rumenitis, it will be sufficient here to allude to general principles only, which consist in withholding all solid foods for the time being and giving bran mashes and oatmeal and linseed gruel, administering laxatives such as linseed oil, with small doses of sulphate of sodium, treacle, and common salt, combined with extract of belladonna and boric acid. When the presence of a foreign body is suspected, the rumen should be immediately opened, the reticulum explored, and the offending material removed (see Rumenotomy). When, however, penetration through the coats has taken place, treatment is useless and the animal should be destroyed. Where convalescence sets in the patient should be placed upon a course of tonics and antacids such as gentian, cinchona, nux vomica, and bicarbonate of soda or potash, while steamed hay, crushed oats, bran, and linseed cake should be ordered.

RETROPHARYNGEAL ABSCESS.

Abscess formations in the post-pharyngeal region are most commonly seen in cattle; they may be simple, but more often specific, the latter being mainly actinomycotic and tubercular. In the horse they are occasionally seen as a result of strangles and influenza. The abscess may be so small as to cause slight stertor in the breathing only, or the accumulation of pus so great as to threaten suffocation. These abscesses can usually be operated upon in the standing position, the horse being restrained by a twitch, the ox by bulldogs, and each securely held by assistants; but nervous and excitable horses and bulls, in the operator's interests, should be cast.

A mouth gag having been placed in the mouth, the tongue is withdrawn and the right hand passed into the pharynx to ascertain the situation and nature of the abscess. If it is very tense and the wall thin, scraping with the finger-nail combined with pressure may effect evacuation. When this takes place the animal usually coughs, the operator sometimes getting a share of the debris. When the abscess cannot be burst in this manner, a pointed lancet adjusted to the index finger by means of a ring should be carried in and the wall of the abscess opened.

It is most important to see that the operation wound is large enough to prevent a too early closure. Subsequent treatment consists of daily withdrawing the tongue and throwing back into the pharyngeal region a powder composed of boric acid and chloride of sodium (1 to 8). When the case is one of actinomycosis or tuberculosis, 10 grains of biniodide of mercury should be added to the above powder and a smart biniodide of mercury blister applied to the throat extending from ear to ear. If the abscess is a simple one, recovery usually follows the operation; if specific, there is a tendency for a recurrence, in which case it is always advisable in the case of the ox to fatten for the butcher.

RHEUMATISM.

Whereas uric acid in man is an important predisposing, if not in some cases an actual, factor in the production of rheumatism, in animals it appears to play a small part. This may be due to a different mode of living in particular and environment in general. In the lower animals nearly every case of rheumatism is due to the direct action of bacteria and their toxins, and it behoves us to treat those cases as such.

Rheumatism may be acute or chronic, articular or muscular.

Acute Form (Articular Rheumatism).—This condition may be seen in any animal and affecting one or more joints. The first step towards treatment is to unload the bowels by a brisk purgative—in the horse by a dose of aloin and calomel; in the ox, sheep, and pig by sulphate of soda; in the dog and cat by calomel, followed by placing the patient on full doses of salicylate of soda, repeating the drug thrice daily until the temperature has been lowered and the painful tension of the joint reduced. Owing to the reducing influence of large doses of salicylate of soda in the dog and cat it may be usefully combined with aromatic spirits of ammonia. When this treatment has been persevered with for a week or ten days it should be discontinued, and replaced by small doses of quinine and hyposulphate of soda. If after a time the case reaches a standstill stage, a course of arsenic, bicarbonate of soda, potassium iodide, and sodium sulphate is advised. In addition to the above constitutional treatment, the joint or joints must be locally attended to. In the early stages this consists of hot fomentations and the application of anodyne liniment—*i.e.*, lead lotion and tincture of opium or belladonna. When the painful stage has subsided, ammonia and turpentine liniment should be applied or a liniment made from mustard oil, turpentine, and lead. After using these, the joint, when practicable, should be bound in cotton-wool or thermogene and a flannel bandage applied. If there is effusion into the joint or even into the surrounding tissue, aspiration under sterile precautions should be practised. This measure tends to reduce tension and the risk of ankylosis, after which massage is studiously carried out. If the animal after some days obstinately refuses to use the limb, forcible movement of the joint is called for with the object of breaking down any adhesions which may tend to form, endangering the future usefulness of the joint.

Muscular Rheumatism.—Under this heading will be included acute rheumatoid affections involving muscles, nerves, tendons, ligaments, and as such these conditions may be seen in almost any animal. A brisk purgative should be administered at the earliest similar to those used in the articular form. The salicylates here also form the most valuable agents—aspirin is a very convenient form for small patients—and after the patient has been saturated with these for a few days he should be placed on a course of colchicum, bicarbonate of soda, and nitrate of potash. Locally hot fomentations to which common salt is added gives considerable relief, after which belladonna liniment should be applied. If the loins are the seat of the affection, a damp flannel cloth may be applied and the back ironed with a hot iron. In the horse a fresh sheep-skin placed on the loins often gives considerable relief. In those cases where the tendons, ligaments, and nerves of the limbs are involved, hot fomentation, belladonna liniment, massage, and "dry" flannel bandaging is indicated. After the initial acute stage has been reduced gentle exercise should be ordered.

Chronic Form (Articular Rheumatism).—When a joint or joints have become deeply involved, drug therapy offers small hope of giving much local relief; nevertheless, along with other means of treatment, they should not be overlooked. The most important are guaiacol carbonate, potassium iodide, and arsenic. Locally stimulating liniments such as camphor, turpentine, and ammonia should be well rubbed into the affected part. Later on blisters may be tried, and when lameness persists the thermo-cautery. Exercise is essential in reducing lameness, and forcible movements applied to the joint tend to break down adhesions and lessen the stiffness. Some cases derive much benefit from Bier's treatment, and this method is worthy of a trial.

Muscular Rheumatism.—Massage here is a valuable agent combined with laxative doses of sulphate of soda and alterative doses of sodium hyposulphate for the larger animals, while for the dog grey powder and quinine are probably the best agents. Later, recourse to blisters and the thermo-cautery may be necessary.

Sero-Vaccine Therapy.—As pathogenic bacteria play an important part in all rheumatic affections, this line of treatment is well worth considering, especially in those cases following influenza, pneumonia, strangles, and distemper. In the acute forms a polyvalent serum derived from an animal immunized by streptococci, staphylococci, and *B. coli* should be injected daily for a week, followed by vaccines. In the subacute conditions sera and vaccines should be combined, while for the chronic phases vaccines alone in full doses are indicated.

Diet.—This, especially in acute cases, is an important factor, and should be non-stimulating. In horses and cattle, bran, steamed hay, all kinds of grain foods, a run at grass, and roots, with the probable exception of potatoes. In the dog a milk diet with bicarbonate of soda is most valuable. Later on green vegetables, fish, tripe, and mutton broth may be allowed. Excess of meat and meat extracts are contraindicated.

As a preventive, rheumatic patients should have an occasional saline dose of hyposulphate of soda combined with bicarbonate of soda and nitrate of potash.

RIGOR.

This is generally the forerunner of a specific fever requiring energetic measures to correct. A diffusible stimulant such as alcohol, ammonia, or ether combined with a full dose of salicylate of soda and quinine should be given. The body must be well rubbed, warmly but lightly clothed, and in the case of the horse the legs bandaged. The dog should be rolled in a blanket and placed in a basket near a fire, with one or two hot-water bottles. In those animals that vomit an emetic may be given with advantage, and it is always advisable to give a purgative.

RINDERPEST, OR CATTLE PLAGUE.

This disease has from time immemorial caused greater loss of animal life than all other bovine scourges put together.

Untold thousands of cattle have succumbed to a disease which, until comparatively recent years, has ravaged the herds of the old world, and has been checked only by drastic methods of slaughter and the strictest quarantine. Our own enormous loss from the visitation of 1865-66 is still vivid in the memory of older men, while as recently as 1895 the Austrian Government maintained constantly a military cordon along its eastern border to prevent the straying of all cattle coming westward such as might possibly introduce the disease into Western Europe. In the same year the Government of the Tsar was offering a reward of a million roubles to the person who could devise a means of preventing and curing so fell a disease.

Although the study of rinderpest had engaged the ablest investigators of the day, it was not until 1896 that Pitchford of Natal—who had been brought out from Europe to meet a threatened invasion of that colony by the disease—announced to his Government that he, co-operating with Theiler, had been able to demonstrate the existence of antitoxic properties in the blood of recovered animals. Koch of Berlin, also brought out by the Cape Government for the purpose of investigation, confirmed these results of Pitchford and Theiler some months later, and the system then devised by these latter workers—in the so-called "simultaneous serum system"—is now adopted in all parts of the world liable to rinderpest invasion. The work of Koch, however, succeeded in showing in the bile of infected animals antibodies of a powerful nature, and upon such finding was established the so-called "bile system" for the repression of the disease.

Both systems have their uses. While the antitoxic serum is the more reliable agent both for prevention or cure, it is not always available at the scene of an outbreak, and, if not available from outside sources, cannot be produced for some months—a lengthy period where a virulent contagious disease like rinderpest is concerned. In such cases the bile is of the utmost use, being, of course, available wherever deaths from the disease occur. Typical cases at or near death are chosen. The ox is killed, laid upon its left side, and an incision made along the flank following the line of the floating ribs. This line is joined to another incision made in the intercostal space of the posterior fixed ribs, and this isolated piece of the thoracic abdominal wall is then forcibly reflected so as to break the ribs at their spinal attachments. This exposes the liver with the distended gall-bladder *in situ*, the average capacity of which latter is 200 to 400 c.c., or a quantity sufficient for a 10 to 15 c.c. dose for about twenty-five head of cattle of varying size. If the bile is to be kept for some time or is slightly tainted in smell at time of collection, it may be mixed with twice its volume of glycerine and stored for a week before using, 25 c.c. of the same being an average dose. Inoculated subcutaneously in this manner, a passive immunity may be induced lasting for about four months, and in many cases longer. Avoidance of the contagion for several days after the operation is advisable, as a refractory condition does not become established for some days.

With the Pitchford and Theiler method of serum immunity an ox is rendered hyperimmune by progressive injections of virulent blood lasting over a period of several months. This blood, either defibrinated or, preferably, used as serum after separation of its corpuscles, is introduced into the veins of the animal sought to be protected, using from 10 to 40 c.c., dependent upon breed and locality. At the same time 1 c.c. of virus is injected intravenously also. This "simultaneous method" gives rise to a modified form of the disease, more or less severe, but only rarely fatal. Where a passive immunity only is sought to be established the virulent blood is omitted, and the animal becomes at once immune to the risk of infection, and remains refractory for a period of about two to three weeks, dependent on the size of the dose and the quality of the serum. A convenient standard of antitoxic value is attained when a dose of 1 c.c. of serum to each 5 kilos of live weight (or a unit dose of about 50 c.c. for a beast of say 565 kilos) suffices to bring about a modified and safe attack resulting in a permanent or active state of immunity.

Where an endeavour is made to save the life of a valuable sick animal, in addition to the most careful nursing, the blood of another beast recently recovered from the disease may be used with great advantage, the blood being defibrinated and injected at once, using large doses if the case is a critical one. Recovery in such circumstances is usual.

Success may therefore justly be claimed both for the treatment and prevention of rinderpest by the modern method of serum therapeutics.—*H. Watkins Pitchford.*

RINGBONE.

By its insistence upon the pronounced hereditary tendencies which involve ringbones the veterinary profession has rendered a lasting service to horse-owners, for now the disease is becoming almost a thing of the past. If the case is seen in the initial stage the shoe should be removed, the foot pared down, and the toe shortened. Hot fomentations, stimulating liniment, and complete rest having been ordered, the disease can occasionally be kept in check.

This treatment being carried out for a few days, a blister should be applied. In these conditions it is inadvisable to turn an animal out to grass. A gallop, especially over uneven ground, straining the hard and soft structures implicated with the disease, will only resuscitate and aggravate the condition. The patient should therefore be confined in a loose-box or open yard. In established cases firing offers the best means for bringing about recovery, and when the articular joints are not affected the prognosis is hopeful. It is the writer's practice both to line fire and puncture. The former should be done as deeply as possible, while the pyro-punctures are inserted between the lines deep into the exostosis, the greatest care, of course, being exercised not to insert the needle into the joint. From ten to fourteen days after firing a biniodide of mercury blister is applied over the fired area, and when the blister is at its height Bier's treatment may be carried out once daily for two or three days and a long rest at grass ordered. If this treatment fails, neurectomy offers the only chance, provided the lameness is not purely mechanical.

RINGWORM.

This term is still retained in our nomenclature, and is applied to the condition technically known as dermatomycosis. The responsible fungi are *Trichophyton* (horse, ox, pig, dog), *Microsporum* (horse, dog), *Eidamella* (dog), *Oospora* (dog), *Achorion* (dog), and *Lophophyton* (fowl).

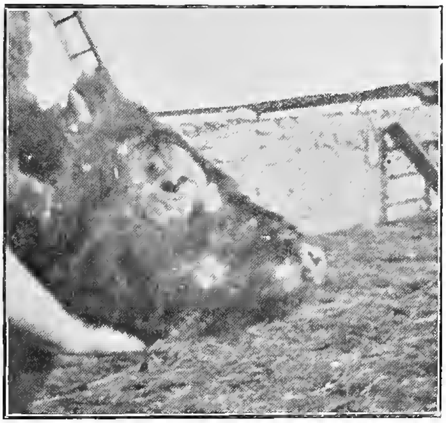

Fig. 157.—Ringworm in a Calf.

The disease is most commonly seen in the bovine species, and more often in young than in adult cattle. In this country it is very rare in the other domestic animals. Perry (Bristol) informs the writer that he had a case of equine dermatomycosis which took on a generalized tendency.

Under antiseptic treatment ringworm is as a rule easily cured, but it is not so much the remedy adopted as the thoroughness of its application which counts. In old-standing cases, before treatment is undertaken, the scales should be removed by scrubbing with a strong solution of washing soda, after which the following ointment is advised as being both economical and efficacious:

℞ Sulphuris Sublimatum Acidi Borici	āā ℥i.
Adipis Benzoati	℥x.

M. Ft. ung. To be well rubbed into the affected parts every other day.

When a large number of animals are affected, scrubbing the affected parts with a solution of liquor carbonis detergens (1 to 20) twice a week proves an expeditious and useful line of treatment.

In obstinate and special cases other treatment may be necessary. Painting with strong tincture of iodine (1 to 6) is much favoured by some practitioners, while others prefer perchloride of mercury dissolved in spirit (1 to 100). Salicylic acid dissolved in chloroform (1 to 10) is also very efficacious, and such agents as creasote, ichthyol, biniodide of mercury, oleate of mercury, sulphur iodide, Lysol, etc., all serve useful purposes.

In those cases which do not respond to treatment readily the writer has found the following formula most useful:

℞ Acidi Chrysophanici	ʒi.
Sulphuris Præcipitati	ʒii.
Adipis Benzoati	℥ii.

M. Ft. ung. To be well rubbed in every two or three days.

Painting daily with a 2 per cent. solution of picric acid has also given the writer excellent results.

It must be borne in mind in treating ringworm that the most active fungi are to be found at the outer margin, so that the dressings should also be applied beyond the infected ring. Further, the attendant who dresses ringworm cases should be instructed to wash afterwards in a strong antiseptic solution in order to prevent infection extending to the hands and arms.

Prophylaxis.—The affected should be separated from the healthy, and the walls, partitions, posts, etc., disinfected. On the first manifestation of a ringworm patch the animal should be segregated and dressed all over with a weak solution of Jeyes' Fluid or other antiseptic. When brushes, combs, clothing have been used, these should be thoroughly disinfected.

Note.—Ringworm may be looked upon as a benign disease, but when neglected, and especially when the animal has been kept on poor rations, it may invade the major portion of the cutaneous surface, disturbing its normal functioning, with consequent auto-intoxication, marasmus, and even death. Dressing the skin in these cases should be carefully carried out and in patches, while the patient is being placed on a course of eliminatives, tonics, and rich food, to which is added cod-liver oil.

ROARING IN HORSES.

By "roaring" is understood a respiratory condition met with in horses owing to paralysis of the left laryngeal nerve, with left vocal cord paralysis as a sequel. The consequence of this is that the laryngeal orifice becomes lessened in volume, and when the animal is galloped or otherwise subjected to great exertion dyspnœa is produced. In the efforts of respiration a loud "roaring" noise is produced, and an animal thus affected is colloquially spoken of as a "roarer." At the commencement of the paralysis, whilst the vocal cord still possesses some movement, the sound emitted is shrill and sharp, and an animal in this stage is known as a "whistler." The change from "whistling" to "roaring" may take some time, but is often only a matter of weeks, and a "roarer" is practically useless for any work which involves great exertion.

Numerous operations have at various times been tried for the relief of this distressing condition, but the only one which has stood the test is the ventricle stripping operation first made practicable by Dr. W. L. Williams, Professor of Surgery in Cornell University Veterinary School, and it is a modification of this which I shall describe. It can be performed on the animal either in the standing position or when cast and secured with hobbles. Some local anæsthetic such as cocaine or stovaine can be used, or, if preferred, the patient can be chloroformed.

Having shaved and sterilized the skin directly over the larynx, an incision is made with a scalpel between the bellies of the crico-thyroid muscle as far as the crico-thyroid membrane, severing the crico-thyroid artery, the cut ends of which are picked up with forceps. If the incision has been made accurately parallel to and between the bellies of the muscle there will be practically no hæmorrhage, and the operation will be almost a bloodless one. At this stage a specially made retractor is introduced to force the muscles apart and expose the crico-thyroid membrane, so that it can be incised. This is done by inserting the scalpel during inspiration, and splitting it completely from the cricoid to the thyroid cartilage, the operator taking care not to injure either. This is very important, especially in a young horse, as injury to cartilage usually ends in ossification. Having thus exposed the interior of the larynx, the retractor is inserted and held or fixed in position in such a way that the vocal cords are well in view. Passing the middle finger into the ventricle of Morgagni, the operator grasps the antero-internal edge of the latter and raises it until it is so tense that it can be incised. The incision is made with a specially shaped knife, and is of sufficiently large size to admit the end joint of the middle finger. By manipulation of the end of the finger the lining membrane of the sac is eviscerated, the sac itself being gripped and lifted out with forceps and then excised along the edge of the true vocal cord with a scalpel or pair of scissors. The wound is then swabbed out with antiseptic, all blood-clots are removed from the larynx, and the patient is allowed to rise.

After-treatment consists in cleaning the wound several times a day with antiseptic lotion until it has healed, usually about ten days or a fortnight.

It is a good plan on the following day to swab out the ventricles or, at all events, to insert the end of the finger in each to relieve any blood-clot which may have accumulated there, but after that the interior of the larynx is better left alone, so that plastic union may take place between the two surfaces made raw by the stripping of the mucous lining. The patient should be put on pillar reins if possible, and kept in a place where there is plenty of fresh air, receiving light diet, for three or four days. It is better that the horse should not lie down at full length until the wound has healed, as instances have occurred of a small piece of straw gaining entrance and forming a fistula.

The animal must be kept under constant observation during the first forty-eight hours, as there is a risk of œdema of the larynx. This may even produce sufficient dyspnœa to necessitate the temporary insertion of a tracheotomy tube, either in the wound or lower down the neck. As a precaution against this, if the operator has to be some distance away afterwards, it is a wise precaution to insert a tracheotomy tube at the time of operating between the cricoid cartilage and the first tracheal ring, without actually cutting either.

Manger feeding is the best for the first month or six weeks after operation, after which the horse may be given walking exercise. After a month of this the patient may be trotted, and after three months be tried at a gallop or canter. A definite opinion cannot always be given until the horse is again in "fit" condition, as many patients make a noise at first, but improve as they get "fit." It is an operation which gives a reasonable prospect of making a useless beast useful in about 75 per cent. of hunters and 90 to 95 per cent. of carriage and cart horses, whilst 10 per cent. will become absolutely noiseless. The author makes this statement as the result of observations made on more than 2,000 patients.—*Frederick Hobday.*

RUMEN, DISEASES OF.

Dilatation.—Consequent upon a heavy meal eaten rapidly the walls of the rumen become greatly distended, and considerable discomfort may be observed, the animal grunting and breathing heavily. In the process of digestion these phenomena usually disappear without any treatment being adopted. If, however, an oft-repeated dilatation occurs, a more or less permanent distension of the rumen and consequent thinning of its walls takes place. Superadded to this, atony is often noted. Such cases require careful treatment, failing which malnutrition and its sequelæ will follow. The patient must be placed upon a concentrated, nutritious diet composed of bran, crushed oats, linseed, and a little steamed hay, sufficient only to cause rough bulk, so that the animal may be able to chew its cud, while moderate quantities of water should only be allowed at each drinking. The stomach and bowels are unloaded by sulphate of soda and treacle, after which a course of the following is advised:

℞	Nucis Vomicæ	ʒi.
	Pulveris Calumbæ	ʒiv.
	Ferri Sulphatis Ex.	ʒii.
	Sodii Bicarbonatis Sodii Chloridi	āā ℥i.

M. Ft. pulv. One powder to be given night and morning in flax tea.

Foreign Bodies.—It is notorious that some cattle have a fondness for all sorts of rubbish, such as stones, pieces of leather, bits of wire, nails, cloth, and even after-birth, etc. Some of these may remain in the rumen for a long time without any outward clinical manifestation, while others demonstrate their presence very early. If they are sharp and pointed they may find their way to the reticulum and penetrate the pericardium, producing traumatic pericarditis and death, or they may pierce the wall of the rumen itself. If the object is large it may act as a mechanical obstruction, producing regular or intermittent impaction. This is a very common condition when the placenta has been swallowed. When these conditions exist, treatment other than removal by surgical means avails little, and as soon as the practitioner has definitely made up his mind that there is a foreign body present he should waste no time in effecting its surgical removal (see Rumenotomy).

Impaction.—Plenalvia for obvious reasons may be due to a variety of causes; thus, neuro-muscular atony; change of diet from the dry to the succulent, or *vice versa;* bad, innutritious food; diseased or frosted roots; fungoid affected grains, cakes, or meals; over-dry foods and restricted water-supply; certain poisons such as acorns and, when the animal lives long enough, yew; mechanical obstruction owing to the presence of foreign bodies, and many others. To the reader it will therefore appear obvious that, before impaction can be successfully treated, the root cause or causes must be discovered and their removal effected. General principles of treatment can only be laid down here, each case being prescribed for specially on its own merits. To remove accumulated ingesta must be the first object of the practitioner by means of stimulants and purgatives such as sodium sulphate, treacle, and carbonate of ammonia, combined with nux vomica. Kneading the rumen, or other means of massage, should be practised, and even the application of a strong mustard plaster over the left side of the abdomen tends to rouse muscular lethargy in the rumen. The patient should also be exercised. All food except slops must be withheld, but plenty of water may be allowed; and if the animal does not incline to drink, a handful of common salt thrown into the mouth once or twice a day is advised. If the impaction still remains obstinate, the writer has found a favourable response in some cases by using the following:

℞	Barii Chloridi	grs. xxx.
	Antimonii Tartarati	ʒi.
	Nucis Vomicæ	ʒii.
	Sodii Bicarbonatis	℥i.

M. Ft. pulv. One powder three times a day in a quart of gruel, not more than six doses being given.

If medicinal treatment still fails to give relief, rumenotomy should be performed and the ingesta removed by the hand. In all those cases where recovery follows, the greatest care is necessary to prevent a recurrence, particularly from a dietetic point of view. The food should be light and digestible, consisting mainly of bran, crushed oats, and steamed hay, and these should only be allowed in small quantities and given often; while the digestive system generally is toned up by giving nitrohydrochloric acid 2 drams, infusion of quassia 1 pint, or nux vomica 1 dram, gentian ½ ounce, bicarbonate of soda 2 ounces.

Rumenitis.—This condition is seen in poisoning by minerals or vegetable irritants by micro-organisms, also in symptomatic conditions pertaining to certain specific fevers, in the presence of foreign bodies, or in cases of neglected digestive derangements. A pint of linseed oil and 1 pound of treacle should be given at once, and repeated every twenty-four hours until the capacity of the rumen has been reduced and the bowels unloaded. To prevent acid and gas formation, the patient is placed upon a course of boric acid 3 drams, chloride of sodium 2 ounces, bicarbonate of soda 2 ounces, and hyposulphate of soda 2 ounces, given three times daily in a quart of flax tea. If the animal is in much pain, as evinced by grunting, 2-dram doses of extract of belladonna should be given three times a day. Should the temperature be high, indicative of auto-intoxication, salicylate of soda and the subcutaneous injection of normal saline solution are advised. If the pulse is weak and running down, aromatic spirits of ammonia is advised. A mustard plaster, to which has been added spirits of turpentine, should be well rubbed over the rumen area, a piece of brown paper applied, and the body covered by a rug. If tympany is present tapping is necessary, and may be repeated if called for. When the condition is due to poisons these require special treatment (see Poisons). In certain cases rumenotomy may be called for, although it must be pointed out that in the advanced stages such patients do not make good subjects for surgical operations. It is unnecessary to add that in all cases of rumenitis solid food should be withheld until the acute stage has been reduced, the diet consisting of mucilaginous drinks and bran mashes. When convalescence sets in, steamed hay, scalded oats, oilcake, and bran mashes are needful, and the patient placed on a course of tonics such as gentian, calumba, ginger combined with bicarbonate of soda, and small doses of common salt and treacle.

Tapping Rumen.—See Puncture.

Tympanites.—The condition may be acute or chronic.

Acute.—If the accumulation of gas is so pronounced and the distension so great that suffocation is threatened, puncturing the rumen (see Puncture) should be immediately performed. In these cases, before expert aid can be called in, the owner or his attendant is often sorely tempted to evacuate the gas by thrusting his pocket-knife into the rumen, and this is often done, the immediate danger of death by suffocation being thwarted, at least for the time being, but the after-effects are sometimes unsatisfactory. The most important, probably, is a plastic localized peritonitis (visceral and parietal) at the seat of operation, partly consequent upon the lack of aseptic measures and partly due to ingesta escaping between the wall of the rumen and that of the abdomen. The result of this is that adhesions take place between the rumen and the abdominal wall, limiting to a considerable degree peristalsis and rumination, with the consequent development of atony, impaction, tympany, and even rumenitis. Amateur tapping, except by a suitable trocar and canula, should therefore not be lightly undertaken. If the tympany is slight, antizymotics combined with purgatives and plenty of exercise, withholding all food, will often effect a cure. The principal antifermentative agents are Lysol, carbolic acid, eucalyptus, Sanitas, turpentine, creasote, and hyposulphate of soda; treacle, sugar, and common salt also exert certain antiseptic influences. The most useful purgatives are sulphate of soda, aloes, and calomel combined with full doses of treacle and salt. These should be repeated if necessary. The rumen should be well massaged and all food withheld for two or three days, when bran, oats, and steamed hay may be allowed sparingly.

Chronic.—Recurrent tympany of the rumen is as a rule an unfavourable condition suggestive of serious organic disease of that organ itself or its adjacent organs, the presence of foreign bodies or enlarged mediastinal (tubercular) glands. When the rumen is at fault much, however, may be done by a regulated dietary such as bran, oats, steamed hay, and linseed cake allowed in small quantities. Succulent foods such as rich grass, turnips, mangels, potatoes, of course, must be eliminated. Medicinal treatment consists of keeping the bowels well open by laxatives and giving nux vomica, aloes, gentian, and hyposulphate of soda alternated with sulphate of iron, calumba, ginger, and bicarbonate of soda. If this treatment fails, the writer has had occasional good results with the following:

℞ Potassii Permanganatis	ʒi.
Potassii Nitratis	℥i.
Acidi Borici	ʒiii.

M. Ft. pulv. One powder to be given three times a day for three days, and night and morning for a week.

In other cases a course of turpentine, Sanitas, and eucalyptus in linseed oil and flax gruel may be given a trial.

When large tubercular glands are situated in the mediastinum, treatment can only be palliative, and after a short trial, if the case does not satisfactorily respond, it is more economical to have the animal destroyed. In fact, if the animal shows clinical symptoms of tuberculosis coupled with chronic tympany, treatment in any form may be ruled out. Where foreign bodies are suspected rumenotomy is called for.

RUMENOTOMY.

This operation is performed for the relief of impaction of the rumen which has defied medical treatment, and for the removal of foreign bodies such as placenta, nails, leather, etc., or vegetable poisons.

Modus Operandi.—The patient, having been secured by a pair of bulldogs, is firmly held by an attendant against a wall and kept there by another with his hands fixing the hind quarters. The hair is clipped over the rumen area, the skin painted with iodine, and several injections of a local anæsthetic made at the seat of operation. The operation site is a point equidistant between the posterior edge of the last rib, the external angle of the ilium, and the lateral processes of the lumbar vertebræ. A vertical incision is made in the skin to the extent of 6 to 9 inches, the muscular elements are then incised, and bloodvessels ligatured if necessary. The parietal peritoneum is then cut through and the rumen wall exposed. The edges of the incised abdominal wall are now drawn well apart by means of retractors. If the rumen is tympanitic, the gas must now be removed by a trocar and canula. This completed, an incision is made in the rumen about an inch long as near the apex of the parietal wound as possible. A suture is then passed through the coats of the rumen and the abdominal wall, one on each side of the incision. The incision in the rumen is then carried down 3 or 4 inches farther, and two more sutures inserted similar to the first. In this manner the rumen is securely fixed to the wall of the abdomen. A fine piece of waterproof sheeting is now placed over the lower half of the lips of the wound in such a manner that part is in the rumen, the other part hanging outside. In this position it is fixed to the abdomen by two spring metal clips, one on each side (see Fig. 159). By adopting these precautions, ingesta is prevented from contaminating the edges of the wound or escaping down between the visceral and parietal peritoneum. The hand is now inserted into the stomach and the contents removed. In the case of impaction this may amount to several bucketfuls, and is a tedious and slow process. Where foreign bodies are present these often require considerable effort to find, and should it be necessary to search the reticulum a very long arm is often required to reach that organ. The operator, therefore, in anticipation, should be content not only to take off his coat, but his shirt also, for the presence of a rolled-up sleeve under the armpit materially shortens the prehensive reach of the hand. If the operator's arm is short and he fails to reach the reticulum, that organ can be brought nearer his reach if two assistants are instructed to place a plank under the abdominal region in the vicinity of the reticulum and forcibly to lift the abdomen upwards. Foreign bodies are

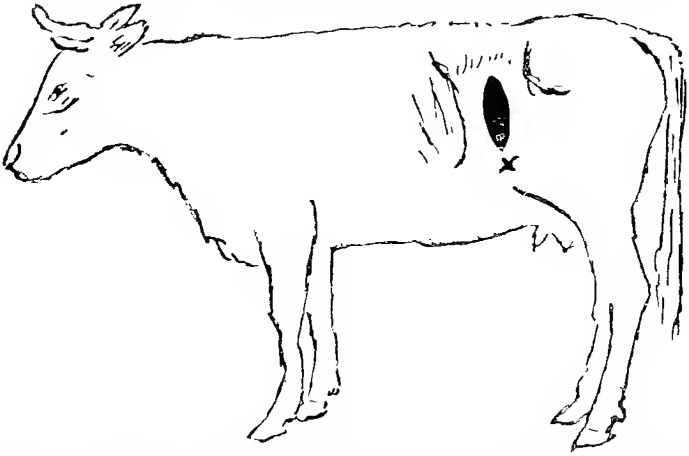

Fig. 158.—Diagram showing the Seat of Operation for Rumenotomy.

usually easy to detect when touched, owing to their hard nature, but an after-birth, usually lying on the floor of the rumen, and more often than not extending into the second or third stomach, is easily overlooked unless the operator has previous experience or a previous warning as regards this probable pitfall. The operation completed and the upper sutures in the wall removed, the muscular and peritoneal coats of the rumen are sutured by means of a continuous silk suture, the edges of the rumen being turned inwards, so that the peritoneal coat lies face to face. This is not always easy, but efforts should be made to attain this end nevertheless. The lower sutures are now removed and the remainder of the rumen wound closed. The muscular elements of the wall are now sutured, and finally the edges of the skin are brought together, a space being left at the lower angle for drainage. The wound is then painted with iodine, dusted with boric acid, and repeated daily. Needless to add, after rumenotomy the patient should be placed on a concentrated, easily-digestible diet for several days, and the bowels kept open with salines and treacle.

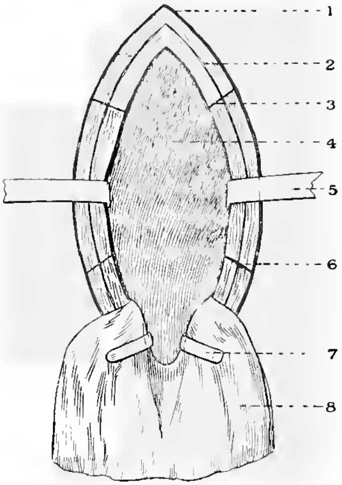

FIG. 159.—RUMENOTOMY. (Semi-diagrammatic.)

1, Skin; 2, muscular layers; 3 to 6, sutures joining the coats of the rumen to the abdominal wall; 4, cavity of the rumen exposed; 5, retractor; 7, clip; 8, sheeting to prevent stomach contents from contaminating edges of wound.

RUMINATION, SUSPENDED.

In all healthy ruminants "chewing the cud" is a normal physiological act, and anything that intervenes to thwart this function acts adversely upon the digestive system, and through it on the whole metabolism. Many are the causes which suspend rumination, and some are discoverable while others are not. The seat may be in the alimentary system itself, in other organs, and even in the brain. It would therefore be impossible in a single article to indicate by treatment the best methods to adopt in order to remove the cause or causes. All that one can hope to do is to lay down rules for general treatment, individual cases being treated on their merits. The animal should be placed on a light, digestible, tempting diet, sprinkled over which is a little common salt and treacle. Cooked foods are sometimes preferred to raw, one animal preferring one kind of food and another another. In short, in these cases idiosyncrasy, carefully studied, is an important consideration, and in many instances it is the unexpected foods the patient prefers, and these should be given. They are compatible with digestibility, for it must be remembered that if one succeeds in getting the animal to start ruminating the road to recovery has been usually found. On the chance that the digestive organs contain unwholesome food or over-retained food a brisk purgative is indicated, after which a course of stomachics combined with antacids are advised. The principal of these are nux vomica, gentian, calumba, cinchona, aniseed, caraway, ginger, bicarbonate of soda or potash, or a course of nitrohydrochloric acid and quassia. Placing the patient in a pen along with a number of other animals during feeding time often succeeds through sympathy in stimulating digestion and rumination.

RUPTURE, LIGAMENTOUS.

Flexor Metatarsi.—This condition usually occurs as the result of the hind leg slipping backwards in the act of an animal starting a heavy load. In the writer's experience it is therefore most commonly seen in trucking horses. Treatment consists of complete rest, a dose of physic, low diet, local hot fomentation, and cooling lotion. Later on blisters should be applied and, if necessary, firing may have to be resorted to. As a rule the patient takes considerable care of the limb, and the union between the ruptured ends is usually complete.

Flexor Tendons.—If the rupture is partial and the fetlock pad only slightly dropped, the shoe should be removed, the toe shortened as much as possible, and a shoe with heels extending backwards 2 or 3 inches with a cross-bar adjustment should be applied. Many layers of bandage, if necessary, may then be wound round the pastern-joint, so that the hollow behind the heel becomes completely filled, giving the fetlock pad a firm resting-place. This completed, a strong stable bandage is applied from the foot to the knee and removed daily for the application of massage and a stimulating anodyne liniment. If the animal takes kindly to slings, slinging is advised, failing which he should be placed in a comfortable box with short bedding. A dose of physic and low diet should be ordered. When the acute stage is reduced a mild blister is advised, and repeated in due course. In some instances firing and a long rest is necessary. When the rupture is complete treatment is usually unsatisfactory, and the animal should be destroyed.

Suspensory Ligament.—In these cases, when both tendons and ligaments are completely ruptured, the subject should be destroyed, or where the ruptures are partial but following upon neurectomy, treatment is also equally unsatisfactory.

When the ligament is partially ruptured or one of the branches completely ruptured, treatment carried out on the lines advised for rupture of the flexor tendons is advised.

Tendon of Achilles.—Probably most often seen in cattle, it is astonishing how recovery takes place in some cases without any assistance whatever.

In the case of the horse, however, when practicable, he should be slung and the tendon well fomented and massaged. Later a blister hastens the reparative process, and the exercise entailed by a run at grass is sufficient both to strengthen the tendon and break down adhesions which are liable to form during repair.

SADDLE GALLS. *See* Galls.

SALLANDERS. *See* Mallanders.

SANDCRACK.

Cracks extending into the sensitive laminæ are most commonly seen in heavy draft horses shod with large toe-pieces. The horny hoof, like other structures of the body, can tolerate a given degree of strain which, if gone beyond, is liable to break down, so that even a healthy hoof may develop a sandcrack. As a rule, however, in practice it is an indication of an inherited or acquired weakness of the wall. If it appears in the centre of the wall it is usually directly over the clip of the shoe, pointing to the fact that the clip, among other things, has here a direct influence upon its production. A sandcrack may, or may not, cause lameness. In the latter condition dirt has found its way into the sensitive laminæ, causing inflammation and even suppuration. In cases such as these the foot should be placed in antiseptic poultices for a few days before operative treatment is undertaken, the rough edges being pared off with a "searcher." Two methods of operating are usually adopted in practice: (1) A **V**-shaped mark is made with the line firing needle of the Dechery or a firing iron. The apex of the **V** points downwards (see Fig. 162), ending in the crack, the arms extending upwards to the coronary band, their distance apart being ½ to 1 inch on either side of the crack. A sharp drawing knife is now used to deepen and widen the **V** grooves, the wall being cut down until the first sign of blood begins to ooze through. These and the crack should then be smeared with tar every two or three days to keep out wet and grit. The toe, if the crack is above that area, must be pared down as much as possible, a bar shoe put on, a clip being adjusted on either side of the toe. (2) A notch may be made on either side of the crack ¼ to ½ inch away, and the blacksmith supervised in driving through a small shoeing nail, which is tightly clinched, the rough point and head being then rasped down. If the crack is a long one, a second nail may also be inserted. Arnold and Sons supply proper clips made for the purpose, with forceps for inserting

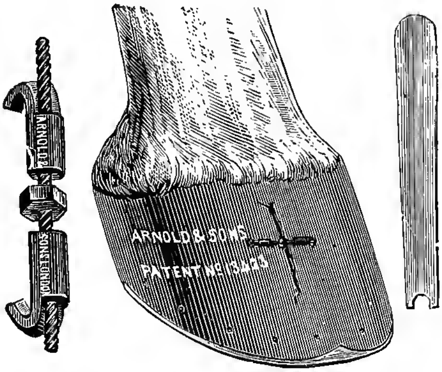

Fig. 160.—Surgical Clip used for Binding a Sandcrack.

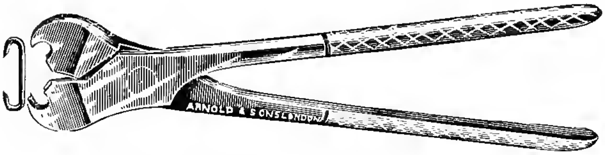

Fig. 161.—Sandcrack Forceps with Clip.

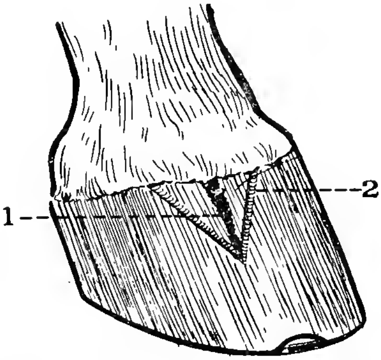

Fig. 162.—Diagram showing Sandcrack.
1, Sandcrack; 2, V-shaped groove in the hoof.

them. These are very easy to adjust, and are effective in giving good results. To stimulate the growth of horn, a blister round the coronet is applied, and if the horn is hard and brittle, a dressing of tar and oil should be brushed into the wall daily.

SARCOCELE.

This term denotes an abnormal swelling of one or both testes. It may be simple or malignant; the latter, however, is the most common condition seen in practice. In the pig and ox the disease is usually tubercular; in the horse and dog carcinomatous or sarcomatous. The testicle alone may be affected, or extension may take place to the epididymis and even to the cord. Castration offers the only hope for complete cure in these cases, provided the disease has not extended too far along the cord. When the cord is seriously affected, however, removal of the generative organs diminishes the blood-supply, and often has a salutary influence by keeping the disease in check.

SCAB. *See* Parasitic Diseases.

SCALDS. *See* Burns.

SCARIFICATION.

Œdematous swellings, due to the accumulation of serum or even blood, are noted in various parts of the body. Thus they may be seen in dropsical conditions of the limbs, abdomen, chest; in the intermaxillary space in liver rot; in the head (due to injuries of the neck, causing it to hang down); in lingual paralysis; in paraphymosis; in the prepuce (from a variety of causes); in eversions of the bladder, uterus, rectum; in purpura, etc. It may be noted here, however, that the œdematous swellings complicated with purpura hæmorrhagica should not be scarified, owing to slow healing of the resulting wounds.

By lightly scarifying the swollen parts tension is relieved, effused fluid got rid of, and the circulation given a chance for the restoration of tone. The skin or mucous membrane, before scarifying, should be well washed with an antiseptic dissolved in normal saline solution. It is then lightly scarified at several points with a sharp lancet guarded by finger and thumb, or a proper scarifying instrument may be used. This is a metal box containing four to eight steel blades, supplied with a hand lever, which can be so worked to protrude the blades a given distance. These are drawn along the surface of the skin, causing incisions. If necessary, cross incisions may be made. After scarification it is good practice to foment the parts with salt and water, the osmotic influence of the salt increasing the flow.

SCHIRROUS CORD.

This condition is not so common as it used to be, perhaps due to the fact that the actual cautery is less frequently used for castration, while antiseptic surgery is more commonly practised. If the schirrus or tumour is situated at the free end of the cord, the operation is very simple. The patient is cast, chloroformed, and placed in the dorsal position. The skin is washed with soap and Lysol, dried, and painted with tincture of iodine. A stout needle, armed with a strong piece of tape, is passed through the lower third of the tumour, the tape being tied in a knot and given to an assistant to hold, who draws upon it, serving the double purpose of lifting the neoplasm from its bed and stretching the skin. An elliptical incision is then made through the skin and part of the underlying tissue. This is still further broken down by the fingers or blunt bistoury until the tunica becomes exposed all round the cord. The tumour is then given a double twist, the chain of the ecraseur passed round the cord, and slowly crushed. In some cases the growth may extend to the inguinal ring or abdomen itself. In these conditions, after dissecting the adjacent tissue, the neoplasm is rotated from left to right once or twice, and then right to left, thereby breaking down adhesions, after which it is usually possible to remove it by the ecraseur.

Subsequent treatment consists of removal of blood-clot, packing the cavity lightly with sterile gauze, inserting one suture to keep it *in situ*, and allowing the animal to rise. The gauze should be removed in twenty-four to thirty-six hours, the cavity irrigated daily with an antiseptic, and low diet and gentle exercise ordered. In those cases where complete removal is impossible, an autogenous vaccine composed of the botryomyces and the pus-producing organisms is well worthy of a trial.

SCURVY.

According to Law, scurvy, as it affects man, is seen in the dog and pig. The contributory causes are errors of diet and bad hygiene. While some authorities assert that a deficient and bad diet alone will produce the condition, it is highly probable that diet deficiency, coupled with bad hygiene, so lowers the vital forces that bacterial auto-infection and intoxication are the actual causes for the clinical phenomena present in scurvy. Be this as it may, there can be no question as to the line of treatment to adopt. The food must be varied and digestible, and the water-supply and surroundings made wholesome.

Law recommends for the pig green food, grains, middlings, bran, roots, fruits, tubers, cabbage, silage, acorns, horse-chestnuts; while for puppies and dogs, fresh new milk is advised. Tonics are also recommended, such as iron, nux vomica, and small doses of arsenate of soda. In the light of our present knowledge, it is just possible that a course of vitamins might do good in cases of scurvy.

SEEDY TOE.

A degenerative condition found usually in the sole of the foot at the region of the toe. It is often due to undue pressure caused by hammering the shoe-clip too tightly against the wall, but it is also seen as a sequel to laminitis, especially where displacement of the pedal bone has taken place.

All diseased horn having been cut away with the " searcher," a few drops of muriate of antimony are dropped into the cavity and allowed to soak in, after which hot tar is applied, the cavity plugged with tar, and a leather sole and shoe put on. These dressings should be applied every few days, and in the meantime the animal prevented from getting its feet wet.

The application of a blister to the coronet stimulates the growth of horn and hastens recovery.

SEPTICÆMIA AND PYÆMIA.

From a curative point of view, the two conditions may be included under one heading, with a third superadded—namely, sapræmia. True *septicæmia* is a condition where pathogenic organisms invade the blood-stream (anthrax); *pyæmia* is a similar condition, to which is added the formation of multiple abscesses, a good example of which is to be found in *irregular* strangles; *sapræmia* is a septic intoxication, the toxins only of the organisms being found in the circulation (tetanus). The bacteria or their toxins may contaminate the system through abrasions of the skin externally, or through their activities on the mucous or serous membranes of viscera internally. Treatment, therefore, is twofold: (*a*) Counteracting the activities of the bacteria at their source; (*b*) neutralizing their poisonous influence upon the metabolism. It will be evident that to enter into a full descriptive treatment of these conditions in detail would savour of reiteration, for these appear throughout this work under their respective headings. Suffice it, therefore, for a general survey of treatment only to be given here. Where the infection arises from an external wound, irrigation with mild antiseptics, such as the hypochlorites, peroxide of hydrogen, proflavine, acroflavine, boric acid, normal saline solution, combined with free drainage are indicated. To these must be added fomentations in the form of hot water and salt, or warm antiseptic poultices; also Bier's treatment, where it is practicable to apply. By adopting any or all of these, phagocytosis is increased. Constitutional treatment aims at the elimination of toxins from the system by the bowels, kidneys, and skin, by means of purgatives (calomel and salines), diaphoretics (acetate of ammonia, salicylate of soda, aspirin, alcohol, sweet spirits of nitre), diuretics (chlorate of potash, nitrate of potash, terebine); while, added to these, quinine and perchloride of iron make ideal tonics. Further, the injection of normal saline solution under the skin and into the rectum must not be overlooked.

The toxins often have a depressing influence upon the heart, in which case special cardiac treatment is called for, consisting of the injection of caffeine, digitalin, or strychnine, and if blood-pressure is low pituitrin. In other cases acute septic diarrhœa manifests itself, which, if allowed to run unchecked, will kill by exhaustion. To correct this, the writer places great faith in small doses of calomel and ipecacuanha.

For horse and ox :

℞ Hydrargyri Subchloridi	grs. v.
Pulveris Ipecacuanhæ Co.	ʒi.
Cretæ Præparatæ	℥ii.

M. Ft. pulv. One powder night and morning in well-boiled flour gruel.

For dog :

℞ Hydrargyri Subchloridi	gr. $\frac{1}{15}$
Vini Ipecacuanhæ	♏x.
Bismuthi Carbonatis	grs. v.
Tincturæ Cardamomi Co.	♏xv.
Aquæ	q.s. ad ʒi.

M. Ft. haust. One teaspoonful two or three times a day.

Sero-Vaccine Therapy.—In all cases of septicæmia a polyvalent serum—streptococcal, staphylococcal, and *B. coli*—should be immediately injected, followed in acute cases twenty-four hours later by a polyvalent stock vaccine obtained from streptococci, staphylococci, and *B. coli*, preparatory to making an autogenous vaccine derived from *materies morbi* obtained from the patient. The serum should be injected daily for five, seven, or ten days, according to the response. The autogenous vaccines are given every two or three days in minimum doses. In the pyæmic conditions, of course, the usual medical and surgical treatment of abscess formations should be observed.

Diet.—Throughout the course of the illness the patient's strength must be maintained with easily digestible food and artificial nutrients such as eggs, milk, gruels, meat extracts; while an abundance of fresh drinking water acts as a valuable eliminative.

SERO-VACCINE THERAPY.

The treatment of bacterial diseases may be divided into non-specific and specific. The non-specific include the general care of the patient—namely, food, hygiene, rest—and such drugs as eliminatives, febrifuges, tonics, sedatives, astringents, antiseptics, etc. The specific embraces those agents which have a direct and indirect destructive influence upon pathogenic bacteria and the neutralization of their toxins, such as immune sera and vaccines. As the result of bacterial growth upon the animal body toxins are formed. Of these there are two kinds—*i.e.*, *exotoxins*, which are given off from bacteria during their active existence; and *endotoxins*, which are liberated during their process of disintegration or death. As these toxins are liberated, the protective body forces become activated and antibodies formed, the most common of these being *antitoxins*, which neutralize the exotoxins; *bacteriolysins*, which destroy the bacteria; *opsonins*, which stimulate phagocytosis. We find many instances in practice where Nature unaided puts up a successful fight against bacterial invasion, and during the course of disease this actually takes place, whether the practitioner assists Nature or not; and we all can recall instances in practice of this kind, but whether the question of "masterly inactivity" is a wise course to adopt is quite another matter, for it is the practitioner's main vocation to assist Nature to reach the high plateau of immunity. This can be brought about by (*a*) passive immunization; (*b*) active immunization.

(*a*) **Passive immunization** consists of injecting into an animal an immune serum already richly charged with antibodies.

Such sera are of two kinds—antitoxic and bactericidal. Antitoxic serum is used against organisms which give off exotoxins, as, for example, in tetanus; bactericidal serum when the toxin is endotoxic—*e.g.*, streptococcal infections. Antitoxic sera are prepared by injecting into an animal gradually increasing doses of exotoxins obtained by the artificial cultivation of certain pathogenic bacteria. When a high degree of immunity has been reached, requiring a period of weeks or months, the animal is bled under strict sterile precautions, the blood collected in a sterile vessel and allowed to clot, the separated serum constituting the antitoxic serum. Bactericidal sera are obtained by injecting an animal with the bacteria themselves in gradually increasing doses, the subject bled, and the serum procured. Sera possess a certain prophylactic as well as a curative value.

The most common sera used in practice are antitetanic, streptococcal, staphylococcal, *B. coli*, pneumococcal, distemper, anthrax, malignant œdema, influenza, South African horse sickness, hæmorrhagic septicæmia. These sera are usually injected subcutaneously, occasionally intravenously, intrathecally (as, for example, in tetanus), and administered *per oram* (as in *B. coli* infection of the bowels).

In addition to the foregoing uses of sera the therapeutical field is widening, for one finds non-antitoxic serum is having increased application.

Thus hæmostatic serum is obtained from an animal in an exalted state of hæmapoiesis brought about by copious bleeding. This serum, injected subcutaneously, is of proved value in severe hæmorrhages. As a hæmostatic it is useful, both as a preventive and curative agent. As a hæmapoietic agent it is also useful, as a tonic in anæmia and debility, in malnutrition, in delayed convalescence, and even in arrested development.

Further, normal and immune serum is used in surgery for the dressing of wounds, the main function being to stimulate phagocytosis to the detriment of the aggressive bacteria.

(*b*) **Active immunization** is the injection of vaccines into the animal body, usually subcutaneously, the function of which is to stimulate the natural immunizing forces to increased activity.

Vaccine therapy has long passed the experimental stage; nevertheless, the subject is so all-absorbing, so complex, and so far-reaching, that we have but just touched the fringe, and every day brings us fresh data.

To prepare a vaccine the causal organism or organisms must be secured from the body of their host, and to prevent alien contamination the greatest care should be exercised in collecting. If the condition is a local one—for example, a closed abscess—the hair should be shaved or clipped, the skin sterilized with tincture of iodine, and opened by a sterile lancet, the pus being collected in a sterile tube and sealed, or the fluid may be aspirated by a sterile syringe. This should be despatched immediately to the laboratory, with a full written clinical description of the case, and the sender's name and address attached. If the bloodstream is the diseased medium, a vein should be opened with studied sterile precautions, and 1 to 5 c.c. collected. Thus procured, a loopful of the *materies morbi* is spread on a sterile slide, stained by the usual stains, and examined microscopically.

By this means the type or types of bacteria present are noted, and if more than one, the predominant type should be carefully observed. The chosen culture media is then inoculated and incubated, if need be, both anaerobically and aerobically. If the infection is a mixed one, plating out is necessary, and when a sufficient culture has been obtained, the colonies are washed off in normal saline solution, the emulsion shaken with the aid of beads, so that the colonies or threads may be broken down and a bacterial count obtained for standardization purposes. The emulsion is now sterilized by heat at 60° C. for an hour, or a 0·1 per cent. tricresol may be added, or the bacteria may be killed by a process of autolysis by incubating the emulsion for twelve hours. Chloroform has recently been introduced to kill the bacteria, and by this process it is stated the therapeutical value of the vaccine is enhanced.

It may here be pointed out that the writer has for some years been working with attenuated bacterial emulsions, and in some cases virulent emulsions instead of sterile ones in suitable selected cases, with much better therapeutical results. These cases particularly apply to *chronic* conditions.

Sensitized Vaccines.—Besredka some years ago introduced *sensitized vaccines*, which he prepared in the following manner: The bacteria suspended in normal saline solution in the usual manner are standardized and mixed with the appropriate immune serum (*e.g.*, a streptococcal emulsion is mixed with an antistreptococcal serum and kept at room temperature for twelve hours). At the end of that period the bacteria will be found to have settled as a deposit at the bottom of the tube. The supernatant liquid is now pipetted off, more saline solution added, and the whole centrifugalized. The liquid is again pipetted off, more solution added, and again centrifugalized. This process is repeated until all the serum has been removed. We have now an emulsion composed of the specific organisms, with the specific antibody of the serum "fixed" to them. It is claimed that a vaccine so prepared has lost all its toxic properties, while retaining all its high therapeutical standard. Such a vaccine is of special value in those cases where a reactive or negative phase is undesirable. It is, therefore, indicated in acute conditions which cannot tolerate a reaction.

Detoxicated Vaccines.—Thomson (see *Lancet*, June 28, 1919) has devised a means of removing the *endotoxins* without destroying the immunizing properties of the vaccine, and by reason of this he claims that doses fifty or a hundred times greater than ever before given can now be administered.

He states that germs consist of five main groups of substances:

1. Alkali soluble material
2. Acid
3. Alcohol
4. Water

Non-toxic, but possessed of immunizing properties.

5. Water and alcohol soluble material, which is highly toxic and which confers no immunity.

In the preparation of these vaccines he employs no heat, but treats the germs with the weakest chemicals for the shortest time necessary to bring about the splitting process. Unfortunately he does not appear to explain how this method is brought about.

Effects of Vaccine Inoculation.—If the vaccine is sterile and the bacterial endotoxins only slightly virulent, no local reaction may be noted, but in white-skinned animals denuded of hair—as, for example, the dog's thigh—a slight redness at the point of inoculation is sometimes observed.

When using attenuated or virulent vaccines an inflammatory swelling usually appears at the point of injection, particularly from the first inoculation, and the subcutaneous tissue may even break down and an abscess form, necessitating lancing. This is by no means an unfavourable or unsatisfactory phenomenon.

When a large dose of vaccine is given, slight constitutional disturbance may be noted. The animal becomes languid and the temperature rises slightly; in the case of a milch cow the milk secretion may be somewhat reduced, the condition lasting from twelve to twenty-four hours. The second and subsequent doses, if they are properly graduated, as a rule, cause little or no reaction. In practice one finds generally that the larger animals show no visible reaction, but the dog and cat appear to be more susceptible, and one occasionally sees both a local and systemic reaction in these animals.

Dosage.—There exists in the minds of many vaccine therapists a nebulous condition as to what constitutes the proper dose in vaccine therapy; hence, some give ridiculously small doses, others moderate doses, while the more heroic adhere to large doses. This diversity of opinion may arise from over-caution or lack of prudence, or it may be due to the fact that some look upon biological therapy in the light of chemotherapy, the argument put forth, perhaps, being that biological products are very potent, and are looked upon in the light of the very active chemical alkaloids, such as morphia or strychnine. To the writer this latter view appears to be based upon an entirely wrong conception. To begin with, the chemical composition of a vaccine and that of an alkaloid are as diverse as the poles; moreover, their therapeutical actions are almost as remote, so that conclusions based on these analogies are more or less false. An alkaloid acts upon a certain system or systems of the animal body, while a vaccine largely functions upon the products of these systems. If, therefore, an absurdly small dose of vaccine is given, the antibody stimulus is so negligible that no therapeutical benefit will follow; while, on the other hand, if it is somewhat too large, Nature will only utilize the amount she requires, the remainder passing from the system by the eliminative channels. It must be pointed out, however, than in acute conditions too large doses are not advised, if for no other reason than that the excretory systems are already overworked, and more strain should not be put upon them. The obvious general conclusions, therefore, are that in acute conditions moderate doses of vaccines should be the order, while in chronic affections large doses are indicated. The question next arises how far apart should the doses be given. For subacute and chronic affections the writer, speaking generally, advises an injection to be given every five, six, or seven days; while for acute conditions, every two, three, or four days. Graduation of doses is also an important matter. The following basis is the one the writer has worked upon for some years, as illustrated by the subjoined diagrams:

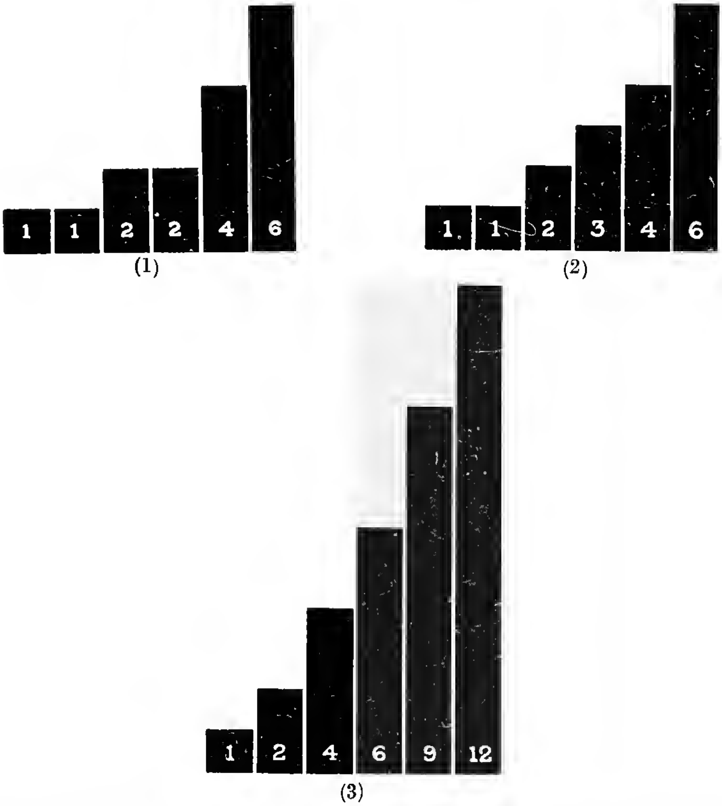

Fig. 163.—Diagrams showing the Proportional Ratio of Doses of Vaccines to be used in (1) Acute, (2) Subacute, (3) Chronic Disease.

Scope of Vaccine Therapy.—Vaccine therapy covers a large range of diseases; in fact, it may be said wherever bacterial invasion, local or general, exists, vaccine treatment exercises a more or less salutary influence, chief of which are the following:

Local.—Abscesses, fistulas, acne, follicular mange, wounds (septic), ulcers, arthritis.

General—Alimentary System.—Distemper, diarrhœa (certain forms), dysentery (certain forms), enteritis, peritonitis, Johne's disease, tuberculosis.

Urino-Genital Systems.—Nephritis, pyelonephritis, cystitis, metritis, endometritis, leucorrhœa.

Respiratory System. — Catarrh, bronchitis, pneumonia, pleurisy, influenza, strangles, distemper, actinomycosis, tuberculosis.

Circulatory System.—Anthrax, black-quarter, pyæmia, septicæmia, malignant œdema, purpura hæmorrhagica, rheumatism, joint evil.

Nervous System.—Rabies, tetanus, specific paraplegia.

Mammary System.—Mammitis, gangrene.

Axioms to be observed in Vaccine Therapy.—1. Collect morbid material with the most rigid sterile precautions.

2. Use autogenous vaccines where possible.

3. Prepare vaccines from pure cultures.

4. Use young culture.

5. Do not over-sterilize by too much heat or chemicals.

6. Do not keep vaccines too long—six months at the outside—and keep them in a cool, dark place.

7. In acute conditions begin with moderate doses, gradually increasing; in chronic diseases give full large doses, and do not be afraid to use a virulent antigen in suitable cases.

8. If the case does not respond to the first course of vaccine, obtain a second supply of *materiès* and carefully note the bacteria present, and from these prepare a second course.

9. Do not look upon vaccine therapy other than as a rational mode of therapy, and not as a miracle worker.

10. Adopt collateral treatment based on scientific and rational lines to assist vaccine therapy.

11. In injecting vaccines, observe the usual sterile precautions so far as practical limitations will allow, although this is somewhat difficult when a large number of animals are to be treated.

12. Do not confound **serum** with **vaccine** therapy.

SESAMOIDITIS.

Most commonly seen in hunters, especially at the beginning of the hunting season, when the ground is dry and hard. It is a very painful condition when noted in the acute form; moreover, the lameness is often difficult to cure. The animal should be placed in a comfortable box with short bedding to prevent it from slipping, a dose of physic given, and the limb or limbs thoroughly fomented, after which cooling white lotion, to which is added 1 to 2 ounces of tincture of arnica, is applied. A layer of flannel is then wound round the fetlock-joint and lightly bandaged. The toe of the foot, if unduly long, should be shortened and a bar shoe put on. If the case does not improve, additional treatment consists in applying Bier's treatment (which see). When the acute stage has been reduced a smart blister should be applied. If this fails to overcome the lameness, firing should be resorted to; failing this, median neurectomy is advised, but, of course, this operation bars an animal from hunting or racing.

SETONS.

Treatment by setons dates back from time immemorial, and, like phlebotomy, our forefathers used them for almost every conceivable condition, with the result that a reaction set in and their use was almost discontinued; so much so, in fact, that the present-day up-to-date practitioners are inclined to look upon setoning with contempt. This is unfortunate, for in suitable cases the seton carries a high therapeutical value, and the writer asserts, after considerable experience, that many of his patients would have come to an untimely end had it not been for the seton.

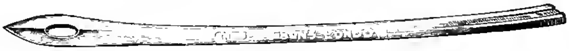

FIG. 164.—SETON NEEDLE.

The primary function of the seton is, of course, a counter-irritant. It produces a localized hyperæmia and consequent leucocytosis, probably exercised through the vasomotor system. It is useful in painful nerve affections, in sprains of the deep-seated major muscles, in the early stages of navicular affections, in joint affections, in fistulous conditions in various parts of the body. A seton consists of a piece of tape varying in width from $\frac{1}{4}$ to 1 inch. The practitioner, having decided upon the area or areas the seton or setons are intended to cover, takes up a flap of skin

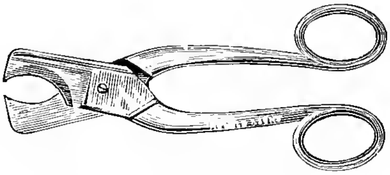

FIG. 165.—ROWELLING SCISSORS.

between the finger and thumb of the left hand, and snips it with the rowelling scissors in the right, or an incision may be made with a sharp lancet. The seton needle, armed with the tape, is now passed in an upward direction between the skin and panniculus to the extent desired, and if the point of the needle is sharp a single thrust drives it through the skin; if it is blunt, the rowelling scissors is again used. One, two, or three setons may be inserted, depending upon the condition and the area to be covered. Before insertion, the tape is dressed with an irritant antiseptic. The writer uses 1 part of oil of turpentine, 1 part oil of origanum, and 2 parts linseed oil.

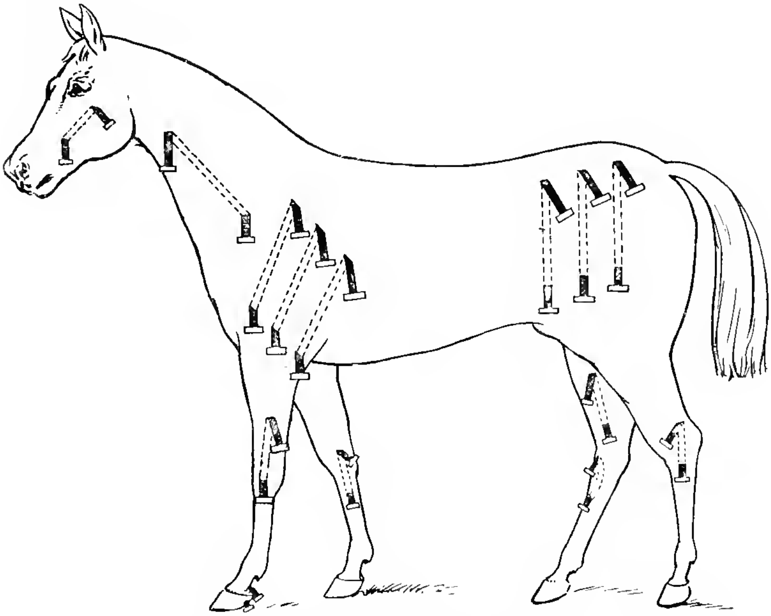

Fig. 166.—Diagram showing the Various Situations of the Body where Setons may be inserted.

When the area to be setoned has been repeatedly blistered, adhesions may take place between the cutaneous and subcutaneous tissue, so that the passage of the needle may be rendered difficult and even impossible. In those cases the needle should be passed under the panniculus. Setons are left in position seven, ten, twenty or thirty days, the time depending upon the nature of the disease and the reaction, beneficial or otherwise. The setons should be moved up and down twice daily, and dressed once a day.

The more pus that is drained away the better, as a rule, are the results. Some hypersensitive horses greatly resent the insertion of setons, while the more phlegmatic take little notice of it. For the former a local anæsthetic should be used, but if a twitch is tightly applied this is, as a rule, unnecessary. When setoning a joint, great care must be exercised not to pierce the capsular ligament. After the operation the horse is tied up short by the head, a double halter being often required, to prevent him from biting out the seton, while a cradle adds to the security. Dogs should be supplied with a collar, or a muzzle may be adjusted.

Some authorities recommend tying the free ends of the seton together. This is a dangerous procedure, for the animal by rubbing may entangle the loop against a fixed object and tear the skin through its whole length. The writer prefers to tie a piece of wood on each end. The discharging pus should be bathed off daily with hot water and a mild antiseptic. In removing the setons, one end is cut with a pair of scissors and the other end drawn out. Each sinus is then irrigated with a mild antiseptic, after which the whole length is squeezed with the hand, thereby evacuating the pus. Healing takes place very quickly, and in a few days the seats of operation will have disappeared.

SEXUAL IMPULSE.

Diminished.—These are due to a variety of causes; thus, the generative organs may be physically defective, when treatment is useless; functional derangement; organic disease, generative or remote; malnutrition; overwork; plethora; general decay. Obviously, therefore, before treatment can be adopted, the cause must be ascertained, and where possible corrected. Where functional atony of the generative organs exists, a course of aphrodisiacs is indicated. The following the writer has found useful:

For horse and ox :

℞ Damianæ Liquoris Nucis Vomicæ Ferri Sulphatis Ferri Phosphatis	āā ʒii.
Aquæ	ad Oi.

M. Ft. haust. To be given night and morning.

Or—

℞ Yohimbini	gr. i.
Pulveris Cantharidis	grs. xii.
Sodii Bicarbonatis	℥i.

M. Ft. pulv. One to be given in a mash daily.

For dog :

℞ Damianæ Liquoris	♏xii.
Syrupus Ferri Phosphatis c. Quininæ et Strychninæ	♏x.
Aquæ	ad ʒi.

M. Ft. haust. One teaspoonful night and morning after food.

In addition to the above prescription for the dog, 2 to 6 minims tincture of cantharides should be given middle-day in a tablespoonful of milk.

Excessive.—See Nymphomania.

SHEATH.

Inflammation.—This is due to an accumulation of debris inside the sheath or injuries from without. A brisk purgative should be given, and hot fomentations and cooling lotion applied locally. If abscess formation takes place the pus must be evacuated by lancing, the wound kept open, and the cavity irrigated daily with a mild antiseptic.

Œdema.—A dropsical condition of the sheath is usually due to grave constitutional conditions such as anæmia, parasitic infestation, debilitating organic diseases; therefore, treatment of the condition in these cases, being largely symptomatic, must include treatment of the specific disease from which the animal is suffering. A moderate purgative is indicated at the outset. If the sheath is much swollen, lancing and scarifying is necessary, followed by hot fomentation and cooling antiseptic lotion. Exercise is very necessary, and if the weather is congenial turning out to grass is advised. In severe cases supporting the sheath by a suspensory bandage is to be recommended.

Tumours.—These may be simple or malignant, sessile or pedunculated. If growing from the inner aspect of the prepuce they may cause phymosis or stenosis, seriously adding to the gravity of the condition. If the growths are small and wart-like, removal by curved scissors and dressing with an antiseptic is all that is necessary. When they are large the animal is cast, chloroformed, and their removal effected surgically. Too much sheath tissue should not be sacrificed, however, owing to the danger of subsequent stricture, with its after ill-effects. To ward against this the operation wound should be prevented from cicatrizing too rapidly, by the daily insertion of a rounded piece of wood well greased with carbolic oil. If the tumour is a large one considerable hæmorrhage may be feared, so that it should be removed, after partial dissection, with the ecraseur.

SHIVERING.

This neuro-muscular disease is only seen in the horse, and from a therapeutical point of view is practically incurable. If the case is seen early and the animal is young, the disease may be kept in check by applying a stimulating emplastrum to the loins composed of cantharides 1 ounce, resin 2 ounces, castile soap 3 ounces, Venice turpentine 2 ounces, Burgundy pitch 2 pounds. The pitch is melted in a saucepan, the resin, soap, and turpentine added, and stirred until dissolved, more heat being applied if necessary; the cantharides is then added and thoroughly mixed. When sufficiently cool, the charge is applied to the loins by means of a spatula. Fine layers of tow are then placed all over the surface, more plaster added, and so on until it is all used. Care must be taken not to apply the plaster too hot, in which case it will act as an active irritant, causing the hair to be destroyed and making the charge fall off prematurely.

In addition to this the animal should have a month's treatment, consisting of the following:

℞	Hydrargyri Iodidi Rubri	grs. v.
	Nucis Vomicæ	ʒii.
	Potassii Phosphatis	ʒii.
	Potassii Nitratis	ʒiv.

M. Ft. pulv. One to be given night and morning in manger food.

On no account should the animal be used for heavy draught purposes or permitted to do much backing. In the case of riding-horses they should be used for driving purposes only. By adopting these precautionary measures the working capacity of the animal will be considerably prolonged.

SHOCK. *See* **Collapse.**

SHOULDER SLIP.

So called "slipping of the shoulder" is most commonly seen in young growing cart-horses. The term, however, is a misnomer, for the joint in itself is not affected. Owing to sprain of the supra- and infra-spinatus muscles, and consequent atrophy, the joint is allowed increased externo-lateral movement when the body weight is put upon it, giving the joint an outward slipping appearance. In the early stages the patient should be rested, given a purgative, while hot fomentation, stimulating liniment, and massage are applied to the scapular muscles. After a few days a blister should be applied and the animal given gentle exercise. If the lameness does not disappear, setoning is strongly recommended (see Setons).

SIDEBONES.

Ossification of the lateral cartilages is much rarer than it used to be. Many animals have sidebones which give them no inconvenience. Occasionally, however, they do cause lameness, particularly when they are the result of treads where two horses are driven abreast or where pronounced contraction of the heels is in evidence. If the case is recent, a smart blister should be applied and the animal given a run on soft marsh land where possible, the shoes, of course, being removed. If the lameness does not disappear deep pyro-puncturing is advised, while at the same time the hoof is rasped down immediately under the sidebone and a **V**-shaped incision made in the wall, the grooves extending almost to the laminar matrix.

The bearing wall at the heel should then be pared down, so that no bearing takes place on the shoe at that part.

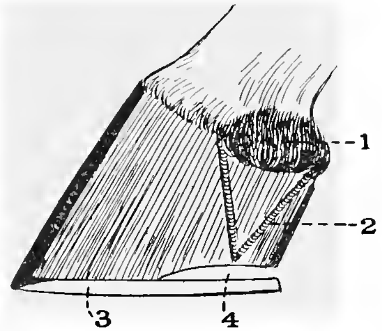

FIG. 167.—DIAGRAM SHOWING **V**-SHAPED GROOVE IN THE HOOF FOR THE PURPOSE OF RELIEVING TENSION IN A SENSITIVE SIDEBONE.
1, Sidebone; 2, **V**-shaped groove; 3, shoe; 4, showing "bearing" removed.

When the animal is fit for work he should be shod with a long heel shoe having no bearing at the heels. By this means a spring is created, thereby diminishing foot jar.

SINUSES, FACIAL (PARANASAL).

The most common disease affecting the sinuses of the head is catarrhal inflammation of the mucosæ, and this is usually secondary to diseased molars, nasal catarrh, influenza, strangles. This catarrh often clears up of itself, no special treatment being called for. Occasionally, however, pus accumulates, becomes pent up, empyema and bone necrosis following, requiring radical treatment in the shape of trephining and persistent subsequent irrigation. Occasionally, malignant affections are seen, such as glanders, actinomycosis, cancer, sarcoma, but as these are incurable they need not be discussed here.

SNAKE BITE.

Casualty from this cause is of rare occurrence in Europe, the only venomous reptile of any importance being the snake of the viper species—the *Vipera berus*, or adder.

In tropical countries, where the climate is such as not to impose upon reptiles the necessity of hibernation, snake bite is of so frequent occurrence as to call for treatment at the hands of the veterinarian, for snakes are not only more prevalent, but retain their activity and aggressiveness throughout the year.

Sea snakes—the Hydrophinæ—although more toxic than snakes of the land varieties, do not come within the province of a short review, which is confined merely to an enumeration of the chief thanatophidia or death-dealing land snakes liable to be encountered by the domestic animal. Such reptiles are of two main families—the colubrine snakes (of which the best known type is, perhaps, the cobra of India) and the viperine snakes (of which the puff-adder and rattlesnake are types). The classification is not unimportant, for the nature of the venom of these two families differs essentially—the one, the colubrine, killing rapidly by central nervous paralysis; and the other, the viperine, destroying life primarily by its action upon the blood elements and tissues themselves. Certain differences of an anatomical nature exist, such as variances of skull formation and disposition of the fang and poison-gland apparatus, etc., but these points are not of present importance.

In the veterinary patient it is rarely that the animal is under observation at the instant of the infliction of the bite. Animals in the act of grazing are generally bitten in the region of the muzzle or face, or upon the leg, while bites incurred in stables and outhouses—frequent places of visitation by snakes—are often inflicted during the recumbent position. It is often a matter of difficulty to decide whether a suddenly developed train of urgent symptoms is due to snake attack or some other cause, for swelling of the tissues at the site of the bite only occurs in the case of viperine attack, and even then not until some time has elapsed. In the case of the effective bite of the colubrine snake little evidence exists to guide the practitioner, and this is especially the case where the end of the fang at the moment of injection of the venom penetrates a vessel in such a way as to allow of the injection of the venom directly into the blood-stream.

In this way symptoms of extreme urgency are developed within a few moments, collapse and death following rapidly. In such case treatment is out of the question, unless there happens to be immediately available a supply of antitoxic serum—" antivenine "—sufficient to neutralize the toxic dose of venom.

As a rule the practitioner does not see the patient until some time has elapsed, and the symptoms of extreme depression, shallow breathing, somnolence, and muscular tremors, suggest the real cause of the grave condition. Sometimes, however, the animal is seen to be struck, and in such case a ligature is likely to have been applied as a first-aid measure by the owner if the bite is inflicted upon a limb. Prompt arrest of the circulation by means of ligature above the seat of bite is the first measure to adopt, giving thereby a chance for adaptation of the system to slow toxin absorption, and affording the time for procuring, where available, a supply of antitoxin. Indiscriminate applications of escharotics, injections of potassium permanganate, and excision (or even amputation), are heroic measures to be adopted only where the snake is known to be deadly, the bite effective, and the time since infliction of the bite not too long. In the same way the use of stimulants should not be abused, and should in no case be given in excess of the requirements of the heart and respiratory functions. Beyond the intelligent use of the ligature, and a treatment designed to prevent collapse and coma, but little can be done if no antitoxin is within reach. Where, however, a supply of antitoxic serum is available, the prognosis is much more hopeful, and—in the case of the viper class, at least—an injection of a serum prepared from the venom in question may be usefully made, either into the jugular vein or around the site of the wound, some hours after the infliction of the bite.

In some countries, such polyvalent sera are prepared and made available at different centres; thus, at Natal, where the first polyvalent serum was produced by Watkins Pitchford, stocks of such serum were maintained by local magistracies, and this policy was rendered more successful by the storing of such serum in a container which in itself functioned as the syringe with which to make the injection. In this way loss of time in adoption of treatment was reduced to a minimum, and an increased percentage of recoveries secured both in the case of man and the lower animals bitten by the dreaded South African tree cobra—the momba—or the hardly less dreaded puff-adder.

Such treatment, however, must be promptly applied if its specific value is to be secured; failing this, the treatment adopted must be largely of an expectant nature, and based upon the principles outlined above. —*H. Watkins Pitchford.*

SNAKE AND VIPER BITES.

Fortunately the practitioner in this country is never called upon to treat animals attacked by any reptiles, save those belonging to the least poisonous types; nevertheless, one does meet cases in country districts, especially in the warmer summer months, where animals have been bitten by reptiles, and which show somewhat alarming symptoms. After being bitten the patient may suffer from general malaise, slight temperature, loss of appetite, and in the cow diminished lactation. At the seat of inoculation the tissues are swollen. These are generally in the region of the limbs, chest, and abdomen. The swelling is œdematous and somewhat painful to the touch. In the severer forms the point of inoculation should be searched for—not always an easy matter—and laid open by a crucial incision. The open wound is then rubbed with pure crystals of permanganate of potash, a tourniquet fixed above the wound where this is practicable, and the animal given a full dose of ammonia.

If there are symptoms of collapse, strong coffee and alcohol are advised, and, if necessary, the hypodermic injection of strychnine and caffeine. Lancing the swelling at various points reduces the œdema, and so also does hot fomentation, followed by the application of white lotion, to which is added a little Lysol and ammonia. In addition, the animal should have a dose of purgative medicine, especially a saline. Plethoric animals should be bled, thereby relieving tension and getting rid of some of the toxins.

SNUFFLES.

This is a catarrhal condition of the nasal mucosæ, the latter becoming swollen owing to the action of specific organisms. It is a common sequel of distemper and so-called influenza in the cat. It is also seen in pigs. The disease being infectious, isolation of the healthy from the diseased is imperative. The surroundings must be hygienic, and a free use of disinfectants is called for.

The Cat.—The diet should be light and digestible, and a course of Scott's emulsion proves very beneficial. Medicinally, the writer has obtained good results from benzoate of soda 2 grains, bismuthi subnitras 2 grains, and Parrish's syrup 10 minims, three times a day in a teaspoonful of water. The bowels should be kept open with occasional doses of medicinal paraffin. The nasal passages are medicated by means of an atomizer with a small nozzle once or twice a day. The following preparation will be found useful for this purpose:

℞	Glycothymol	♏vi.
	Mentholis	grs. ii.
	Proflavine	gr. i.
	Sodii citratis	grs. viii.
	Olei amygdalæ	q.s. ad ℥i.

Vaccine Therapy.—The organisms most commonly present in the writer's experience are streptococci, pneumococci, an organism resembling the *Micrococcus catarrhalis*, and very occasionally *Staphylococcus albus.* A nasal swab having been taken with due precautions, the organisms present are cultivated and from these a vaccine made.

An injection should be given every six or seven days.

The Pig.—The bowels should be moved by sulphate of soda, and the animal given 5 grains of benzoate of soda and 10 grains of chloride of ammonia in food night and morning, while the following are inserted into each nostril:

℞	Mentholis	grs. vii.
	Acidi Borici	grs. xxv.
	Paraffini molli	℥i.

M. Ft. ung. A small quantity about the size of a large pea inserted into each nostril daily with the finger.

SOLE, BRUISING OF.

Horses and cattle treading on hard, stony, or frosty ground are liable to bruise the soles of the feet, especially if the horn is thin and weak. If the case is seen early poultices should be applied, and in a few days all lameness will have disappeared. If neglected pus may form, necessitating opening the hoof at the injured part and giving vent to the discharge, after which a few drops of muriate of antimony are applied and the foot is placed in antiseptic poultices for a few days. When pus has ceased discharging in the case of the horse, it is dressed with tar covered with tow and shod with a leather sole, the shoe being removed in a few days and the wound redressed.

SORE SHINS.

Acute periostitis of the long metacarpal bones is occasionally seen in young growing race-horses and hunters. If the case takes on a mild form, the administration of a brisk purgative, low diet, rest, and the local application of hot fomentation, followed by stimulating liniment, will usually bring about resolution. In severe cases periosteotomy may be necessary. The hair is shaved at a point situated in the lower third of the anterior surface of the cannon bone, painted with iodine, and a sterile periosteotomy knife passed through the skin and forced upwards 1 to 2 inches, the edges of the knife lying flat between the bone and the skin. It is then rotated so that the cutting edge rests on the periosteum, and in this position, with considerable pressure upon it, it is drawn downwards to the cutaneous wound. By this means the periosteum is cut through, and allows for the escape of sero-sanguineous fluid. Bier's treatment should now be carried out, the compress being adjusted just above the knee. Following this the skin wound is painted with tincture of iodine, sterile cotton-wool applied all round the cannon bone, and a bandage *lightly* applied. This should be removed, and the wound dressed every twelve hours. When the discharge has ceased to flow, the bone is irrigated by means of an adjusted hose-pipe for two or three hours daily, the patient being given gentle exercise. Later, a strong biniodide of mercury blister should be applied, and the animal ordered a long run at grass.

SORGHUM POISONING.

Purgative and demulcent drinks should be given. Symptoms of collapse are dealt with by the application of cold douches, the administration of stimulants, and the inhalation of ammonia.

Atropine sulphate may be injected hypodermically to stimulate the cardiac and respiratory centres.

Tympanites must be dealt with by passing the probang or by puncturing the rumen.

Animals should not be allowed to feed on the stalks of the large millet (*Sorghum vulgare*) when stunted by drought, as in this condition hydrocyanic acid is elaborated.—*G. K. Walker.*

SOUTH AFRICAN HORSE SICKNESS.

A disease essentially of equines, the horse being more susceptible than the mule, and the ass being almost refractory. Dogs are susceptible to inoculation, but so far no naturally contracted form of the disease has been described in canines.

A specific disease of paludal origin, horse sickness has been responsible for enormous wastage throughout the recorded periods of South African history, and it is only of late years that the observations of scientific workers have shown that measures of prevention are practicable.

The agency of a flying insect in the production of the disease (by some species of mosquito) was shown first by Pitchford, who exposed horses in a well-known deadly region and kept them alive for an indefinite period in gauze-protected boxes, while the control horses tethered alongside invariably and rapidly succumbed; and as a corollary to this finding the same observer also showed that the horses stabled in a smoky atmosphere or rubbed down with a paraffin rag could practically defy infection so long as such precautions were maintained. Based upon the same principle of prophylaxis he later expressed an opinion, which became amply supported by subsequent experience, that a great measure of protection would be found in the adoption of systematized dipping for horses at short intervals in an arsenic and paraffin emulsion dip throughout the sickly season, a procedure which he showed could be practised every third day without drawbacks on the score of health or condition.

Meanwhile Theiler, working on a different principle of protection, approached the subject by the production of a state of immunity induced on the lines first shown to be possible by Edington—viz., the establishment of a serviceable degree of immunity through the use of a hyperimmune serum.

This serum he produced by injection (transfusion) of large quantities of blood of a horse suffering from horse sickness into the veins of an animal which had recovered from the disease, such hyperimmune serum being subsequently injected in bulky doses (about 350 c.c.) into the veins of the animal to be protected, together with a few cubic centimetres of the virulent blood of a sick horse, and in this way, after a more or less well-pronounced condition of hyperpyrexia, a serviceable protection was established.

The mule is much more adapted to this system of protection than the horse, the risk of death being about 2 per cent., as against some 5 per cent. in the horse. Deaths from subsequent attacks of horse sickness amounting to as much as 5 per cent. in the protected mule and 10 per cent. in the horse show that the system of protection is only relative and unsubstantial, being only to be advocated where the risks of infection are great and where no adequate smoke stable protection exists.

Between the two systems of protection outlined above the South African farmer enjoys a considerably greater measure of protection than that possessed by his forefathers. Virulent outbreaks of the disease, destroying from 60,000 to 80,000 horses in the season, are happily never now experienced, a fact due to the above systems of prophylaxis.

No therapeutic measures have been found of any avail when the disease has once become naturally established in an animal.—*H. Watkins Pitchford.*

SPASM.

Diaphragm.—Occasionally seen in the horse, this condition often gives rise to distressing symptoms, which fortunately, however, are as a rule amenable to treatment.

The hypodermic injection of morphia and atropine generally affords relief. This should be followed up by a full dose of aromatic spirits of ammonia, and as the trouble most probably arises from some form of gastro-intestinal derangement acting through the sympathetic nervous system an aloetic purgative should be given. In obstinate cases 2 drams of camphor and 6 drams of chloral hydrate may be tried, or the patient put under a course of bromide of potassium. For two or three days after the attack the animal should be kept on sloppy bran mashes and allowed nothing solid.

Muscles.—Due to nervous irritation, a set of muscles presided over by the affected nerve or nerves become spasmodically contracted, causing the patient considerable pain. The affected muscles should be fomented with very hot water up to 110° F., and a stimulating anodyne liniment well massaged into the parts. As an emergency, a mustard plaster made with vinegar is also serviceable. If the animal is in much pain, a full dose of chloral hydrate is advised and a purgative administered. When the painful stage is reduced, gentle exercise should be ordered.

SPASMODIC COLIC. *See* **Colic.**

SPAVIN. *See* **Bone Spavin.**

SPAYING. *See* **Ovariotomy.**

SPEEDY CUT.

This is an unpleasant condition, inasmuch as an animal that speedy cuts is liable to fall and dangerously injure himself. Further, the more he cuts the more he will, for at the point of cutting the part swells, thereby increasing the liability to cutting. Shoeing is all-important here. The wall of the foot and toe which does the injury should be rasped as fine as possible. The exact spot which causes the blow can usually be located, for it is more often than not tinged with blood. This part should receive special rasping. The inside heel of the shoe, instead of being convex, should be almost straight and kept well under the wall. In bad cases a three-quarter shoe is advised. Animals liable to speedy cutting are worst when leg weary—short journeys are therefore advised—also horses out of condition, in which case the system should be toned up with good food and, when possible, an extended rest given. Obstinate cases may with advantage be blistered on both fore legs, and given a long run at grass without shoes.

SPERMATIC CORD.

Inflammation is occasionally seen in male animals as the result of an external injury, but it is more common in those recently castrated, due to septic infection of the cord during, or subsequent to, the operation. When a clam, chain of the ecraseur, or by whatever means the operation has been performed, is infected with pathogenic organisms, there is always the liability of cord infection following, which becomes much swollen and tender, or the cord may become affected through injury to it in the process of castration, preventing its complete withdrawal along the inguinal ring. If only one cord is inflamed, the animal goes lame on the leg on the affected side. The patient should be given a purgative, while hot fomentations are applied to the scrotum. If the scrotal wound is closed, it must be opened with clean fingers and adhesions to the cord broken down. The sac is then thoroughly irrigated with a mild antiseptic in normal saline solution. If an abscess forms, it must be lanced. The patient generally inclines not to move, owing to the pain; this must be overcome by forced exercise carried out two or three times a day, the stiffness usually passing off. If the cord is affected with botryomycosis, a schirrous cord will be the inevitable result, and must be treated accordingly (see Schirrous Cord).

SPINAL CORD, DISEASES OF.

Concussion.—If the injury to the spine is slight, improvement and recovery may be looked for; if severe, the case is usually hopeless from the commencement. The animal should be made as comfortable as possible, and in the case of the horse slinging may be considered advisable. A purgative dose is given, assisted by enemas, and a stimulating liniment rubbed into the loins daily after the application of hot rugs. When the acute stage has been reduced the patient is placed on a course of potassium iodide and nux vomica, while in the dog, in addition, electrolysis may be given a trial.

Compression.—If due to neoplasms, tuberculosis, parasites, pus, treatment is hopeless, and the animal should be destroyed. If it is caused by slight pressure of the vertebral column, as, for example, in casting, and there is only slight interference of locomotion, treatment may be fairly hopefully undertaken. A purgative having been given, a stimulating liniment should be rubbed into the loins, or a mustard plaster applied. After the elapse of a few days a biniodide of mercury blister is indicated, or a stimulating pitch plaster composed of pitch, resin, soap, and cantharides applied, and the animal given a long rest. If there are indications of spinal effusion, a course of potassium iodide is indicated.

Inflammation of the coverings or substance of the cord are very serious conditions, and the owner should be informed that the prognosis is anything but favourable. A dose of physic, enemas, and catheterization all tend to relieve spinal tension, so also do hot rugs to the loins and bleeding in full-blooded animals. The writer has also found a fresh sheep-skin applied to the loins most useful in acute spinal conditions.

The patient is kept as quiet as possible, and in the case of the horse slinging must be considered. If the animal is very restless, a hypodermic injection of atropine and morphia allays reflex irritation, and the patient should be placed on a course of full doses of bromide of sodium.*

Recovery may follow occasionally, in which case a long rest is imperative; but extension may take place to the brain and end fatally, or partial or complete paralysis may follow. In the latter case the animal should be destroyed. In the former a course of potassium iodide, sulphate of soda, and nux vomica, should be prescribed, and blisters, charges, or galvanism, applied to the loins, and a long rest ordered.

SPIROCHÆTOSIS OF FOWLS.

Several observers have reported considerable success from the intramuscular injection of soamin. One-tenth to one-fifth of a grain, dissolved in 1 c.c. of water and injected in the pectoral muscle, is recommended, both as a cure and as a preventative. " Salvarsan, neosalvarsan, and atoxyl have also been used successfully " (Aragao). The destruction of the ticks which carry the disease is essential. Perches may be isolated by water.—*G. K. Walker.*

SPLINTS.

Very few young horses are completely free from splints, and yet in many instances they cause no inconvenience. Splints which are liable to give trouble are those situated close under the knee, or between the tendinous structures and the metacarpal bone, or when their prominence on the inside of the limb makes them liable to be struck with the opposite foot. Various methods are adopted to overcome the lameness caused by splints. When the splint is prominent, superficial pyro-puncture is recommended, and later on a blister applied. When a chain of splints exist under the tendons, a smart blister should be applied and rest ordered. If this fails, a seton along the edge of the metacarpal bone may be tried, or the bone and tendons may be fired—line firing—and later on the limb blistered. In obstinate cases of lameness proceeding from this condition, after all other methods have failed, the writer has obtained some benefit by the judicious and patient use of Bier's treatment. In these severe cases a long rest is usually needful.

Some authorities recommend periosteotomy in splint lameness. The writer has never seen any benefit derived from this procedure. When the splint projects on the inside of the limb, interfering with locomotion, the animal should be cast, an anæsthetic injected over the splint, the skin shaved and sterilized and severed with a sterile knife the length of the splint, the edges drawn apart with retractors, and the exostosis curetted or chiselled off. The cavity is then mopped out with tincture of iodine, and the edges of the wound brought together with sterile sutures, cotton-wool applied, and bandaged. If the bony growth is very pronounced an elliptical piece of skin should be removed, so that when the skin is sutured the edges are brought together without any superfluity of cutaneous tissue. After suturing, the operation wound is covered with collodium, a layer of cotton-wool applied, and the whole bandaged.

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* The writer here prefers the sodium to the potassium salt,

If the operation has been done under strict sterile precautions, the wound will heal by first intention.

In those cases where this operation is not decided upon, blisters or pyro-puncture may be tried, the animal made to wear a boot, and the precautionary measures in regard to shoeing adopted, as advised in "Speedy Cut."

SPRAINS.

The treatment of sprains, to be thoroughly dealt with, is so extensive as to be beyond the scope of this work. There are, however, certain underlying principles, common to all sprains, which must be recognized, and deserving of special notice. The aim and object of every practitioner is: (1) To check or limit extravasation when called in soon enough; (2) promote early absorption; (3) to obtain early healing of the damaged structures; (4) to restore the patient to its normal locomotory capacity.

Sprains may be classified according to the structures involved—*i.e.*, (1) *tendinous and ligamentous*; (2) *muscular*; (3) *articular*.

Tendinous and Ligamentous.—In the horse it is the tendinous and ligamentous structures brought prominently into play during locomotion that are most commonly injured, and of these the structures especially situated below the knee and hock.

A tendon or ligament may be slightly stretched, or there may be complete rupture of a number of the fibres which compose these structures; or the injury may be so great as to cause complete rupture of the substance itself, or its attachment to the skeleton may be severed. Needless to add, this latter phase is a serious condition and usually incurable. Rest in any of these conditions is of first importance. We cannot order our patients to bed, as is done in human surgery, but we can limit their movements by confinement indoors, by slinging if necessary, and by immobilizing the limb by means of splints and bandages.

To attain the objects aimed at in the opening remarks the following is advised:

No. 1.—Administering a brisk purgative followed by diuretics, ordering a low diet, and applying equalized pressure by means of cotton-wool and bandages. In applying a bandage to the back tendons of the limbs, a roll of cotton-wool must be placed beforehand along the internal and external lateral aspects of the limb, so that equalized support may be obtained.

No. 2.—Absorption is assisted by hot fomentations, liniments, and massage.

No. 3.—This is brought about by rest, and later by blisters and firing.

No. 4.—Steady exercise; where contraction has taken place, forcible stretching, and, if the back tendons are involved, lowering the heels as much as possible, and applying a shoe with short heels and a long, thick toe-piece. Finally, tenotomy may have to be resorted to.

When a tendon remains much thickened and the owner resents firing or blistering, the writer has obtained good results by sprinkling on a piece of calico soaked freely in vinegar or weak acetic acid the following powder: 1 part of camphor, 2 parts of chloride of ammonia, 4 parts of nitrate of potash. This dressing is laid on the skin, covering both bone and tendons, a roll of cotton-wool is placed on each side of the tendons, and a stable bandage fairly firmly applied. The dressing should be repeated every twenty-four hours, increasing the bandage pressure each day. If the skin becomes irritated, the dressing should be left off for a few days, the surgeon being content with dry cotton-wool and pressure.

Muscular.—Sprain may be confined to one or a group of muscles. It may amount to the laceration of a few fibres, or complete rupture of the whole structure. Here, also, the above principles of treatment are called for.

Unlike, however, sprained tendons, where hypertrophic changes tend to follow sprains, atrophy is the usual terminal sequel. This latter condition is particularly noticeable where there is stretching or bruising of the trophic nerve or nerves also. For this, massage, strong liniments, blisters, setons, exercise on soft, boggy ground, and even sea swimming, may all be tried in rotation.

Articular.—A joint may be strained as the result of violent muscular action, or it may follow extreme external violence, in which case there is a tendency for the formation of gross lesions in the joint and bones; the latter may even be fractured, adding gravely to the complexity of the case. If pronounced swelling comes on immediately following injury to a joint, the practitioner may safely conclude that hæmorrhage has taken place into the capsule or surrounding structures, or perhaps both. If the swelling is deferred some hours, it is due to the accumulation of post-inflammatory—*i.e.*, serous—effusion. In either case, where it is practicable, the line of treatment is obvious—namely, equalized pressure.

The joint should be encased in a fair thickness of cotton-wool, and a flannel or a proper elastic bandage very firmly applied. If the joint is the knee, the bandage will be kept in position more securely by adjusting a knee-cap over it. The bandage should be removed every twenty-four hours, for it will be found after this period that, owing to the absorption, slackness takes place; in fact, for this reason removal every twelve hours would be advantageous, but as the pressure must be equal throughout the surgeon must do his own bandaging and not leave it to amateurs. Further, when a bandage is taken off relaxation of the vessel walls follows, followed by compression, when it is again put on. This has in itself a local tonic influence much to be desired, as it facilitates repair and hastens absorption. A week's treatment of this kind will generally prepare the joint for brisk massage and gentle exercise, unless, of course, there is a broken bone, when treatment proper for fractures is called for.

In addition to the foregoing treatment, constitutional therapy should not be overlooked. A dose of physic at the outset lowers blood-pressure and joint tension, and so also does a low non-stimulating diet. As a complication, stiffness of the joint may follow, consequent upon the formation of adhesions. These must be broken down by forcibly flexing the joint, or making the animal walk or trot on soft ploughed land. Later, blisters should be applied, and if the lameness is of an obstinate character setoning or the actual cautery may be resorted to.

In the writer's experience the joint in the horse which gives most trouble when severely injured is the stifle, probably by reason of its floating anatomical disposition.

STAGGERS.

The term "staggers" may be used to cover a number of affections, but in this note it will be confined to those conditions defined as mad staggers, sleepy staggers, stomach staggers. Staggers is not a disease, however, but a symptom. Treatment, therefore, can only be symptomatic and general.

Mad Staggers.—This condition is symptomatic of inflammation of the brain or its coverings. The animal must be prevented from injuring itself. It should, therefore, be in charge of an attendant all the time. If the case is seen early, treatment may be of use; if it is a severe established one, it usually ends fatally. Where the pulse is full and bounding—and it usually is—free bleeding from the jugular is called for, followed by a full hypodermic injection of morphia and atropine.

If the patient will permit of being drenched, 1-ounce doses of bromide of sodium should be given thrice daily and a full purgative administered—for the horse, aloin and calomel, with repeated enemas; for the ox, calomel, aloes, sulphate of soda, with treacle if necessary.

Very cold water or ice packs should be applied to the poll. If in the course of two or three days the frenzy ceases and the animal becomes more normal, recovery may be hoped for, when a course of potassium iodide combined with alterative doses of calomel and small doses of nux vomica may be prescribed. The diet should consist of nothing but slops for a week at least. If recovery is slow, a blister should be applied to the poll and neck.

In time the animal may be turned out to grass, but it must be kept out of the direct effects of the sun's rays.

Sleepy Staggers.—The previous condition occasionally merges into this form, or it may arise from an independent condition of the brain; more commonly, however, it is observed as a sequel to gastric impaction. The treatment consists of giving a full purgative dose, similar to that advised in mad staggers, but to this should be added full doses of carbonate of ammonia. Enemas also assist purgation. A biniodide of mercury blister should be applied to the poll. If fluid is suspected on the brain, a course of potassium iodide is indicated. When recovery is slow, a seton inserted on either side of the poll may be an advantage.

Stomach Staggers.—This condition is usually preceded by, and runs concurrent with, acute gastric indigestion, followed by impaction due to errors of diet. A sudden change of diet from the dry to succulent, or *vice versa*, is a prolific source. Turning cattle out on rich succulent grass or young clover, feeding to excess on moist brewers' grains, excess of roots, swedes, mangels, potatoes, are all common causes. A brisk purgative combined with a diffusible stimulant, such as carbonate of ammonia, assists in unloading the bowels and relieving cerebral blood-pressure.

This is followed by a course of nux vomica, bicarbonate of soda, and alterative doses of sulphate of soda. The animal should be fasted for thirty-six to forty-eight hours, after which sloppy food may be given for a few days before the normal dietary is prescribed.

STERILITY.

Male.—Functional derangement of the generative organs, often due to excessive copulation, is an occasional cause of sterility, the remedy for which of course is obvious—*i.e.*, limit the services and place the animal on a course of generative tonics similar to those recommended under

Sexual Impulse. The act of copulation may culminate in failure through a defective penis, for which treatment is of no avail. Sexual appetite may be absent through lack of stimulation, and for this aphrodisiacs and good stimulating foods are necessary. If the animal is excessively fat exercise, restricted diet, and a course of nux vomica and iron is recommended. When there is organic disease of the generative organs, treatment is of no avail. Occasionally one sees a case in practice where the animal is in perfect health and fit in condition, and to all appearance the generative organs are healthy, yet sterility is present. The semen in these cases should be examined microscopically at or soon after copulation, when it will be found the spermatozoa are probably non-motile. For such cases a course of damiana, strychnine, phosphorus, and iron is advised, while a smart cantharides blister should be applied to the loins.

Female.—The causes of sterility in the female are legion. The incurable cases are those where the ovaries are extensively diseased, malignant growths in the uterus, maldevelopment, organic disease of the os uteri, stricture of the vaginal canal and os.

The curable cases are: Where the presence of a cyst in the ovaries is detected, the removal is effected by passing the hand into the rectum, grasping the ovary or ovaries, and crushing the cystic wall. The fluid escapes into the peritoneal cavity, but, being usually sterile, no ill-effects follow. Inflammatory diseases of the uterus, metritis, pyometra, leucorrhœa, the treatment of which will be found described under their respective heads. Bacterial infection, particularly by the bacillus of Bang, sometimes tends to cause prolonged periods of sterility, the appropriate treatment for which is vaccination. Rigid fibrous or occluded os uteri is also a common cause of sterility, the most satisfactory treatment for which being artificial insemination. An abnormally narrow vaginal canal which, owing to its anatomical disposition, is unable to "basin" the semen. For this defect artificial insemination is the only remedy. Inflammation of the vaginal canal is also another cause, for the treatment of which see Vaginitis. The vaginal and uterine mucosæ, for some unknown reason, in some cases secrete an acid instead of an alkaline fluid which is capable of killing the sperm. This can be demonstrated by using litmus paper. The condition is corrected by placing the animal on full doses of bicarbonate of soda and lime water, while a vaginal douche is administered daily for a few days prior to service composed of a 3 per cent. solution of bicarbonate of soda and lime water. Animals in very fat condition, as well as those in extreme poverty, are often shy breeders. The remedies to be adopted in such cases are obvious. Finally, a change of sire is often productive of fertility, and, further, a young two-year-old unbroken colt, running at grass, will succeed in impregnating a mare which probably has remained sterile for years after service with highly fed older stallions.

STIFF SICKNESS (" Stiffziekte " of the Dutch Settlers).

The exact nature and cause of this specific febrile disorder is still obscure, but it is a disease—principally of bovines—having a wide distribution in South Africa, being met with also in Egypt and countries north of the Equator.

The disease is characterized by a short course of only three or four days, during which the temperature is considerably elevated, and other constitutional symptoms are present, such as inappetence, failure of the functions of rumination and lactation, and a great disinclination to move. This latter symptom has given to the disease its descriptive name of " stiff sickness," and the general appearance of the affected beast suggests the existence of an acute attack of rheumatism, particularly as the involvement of joints and muscular areas is frequently metastatic.

The very slight mortality and short duration of the disease are doubtless responsible for lack of precise knowledge concerning its incidence and spread.

The possibility of transmission of the infection, after an incubation period, from one animal to another by an inoculation of febrile blood would denote the specific nature of the disease; otherwise the natural tendency would prompt a search for an etiological factor in the ingestion of toxic products, vegetable or animal, such as give rise to the train of muscular and nervous symptoms shown in the disease " lamziekte," or in the " pushing sickness " recently investigated so ably by Dr. Andrews in Natal.

The frequency of the involvement of the mucous coat of the abomasum in an inflammatory process would further tend to suggest a state of acute poisoning, did not a parallel phenomenon in other diseases (such as horse sickness or rinderpest, etc.) show that stomach lesions such as these may exist independent of the presence of an irritant or toxic substance in the gastro-intestinal apparatus.

Treatment of stiff sickness is directed to the amelioration of the more urgent symptoms, and to such details of nursing as are dictated by the experience of the farmer. No specific treatment is at present known, nor is any prophylaxis, based upon ascertained or scientific data, practised by the South African stock-owner.—*H. Watkins Pitchford.*

STOMACH TUBE, ITS TECHNIQUE AND USES.

"Irrigation of the stomach was practised as early as 1876 by Damman in an experiment foal. A rubber tube closed at one end with a conical plug and provided with openings above was introduced. Grains of oats were removed by this tube, but not particles of hay, evidently because the openings above the closed end of the tube were too small" (Huytra and Marek, vol. ii., p. 306).

There are two kinds of tube in use, the single and the double, both of them of pure rubber. The single is 10 feet long, $\frac{3}{4}$ inch in diameter, lumen $\frac{1}{2}$ inch. The first mark is at 15 inches and the second 51$\frac{1}{2}$ inches further on, a total of 66$\frac{1}{2}$ inches being evidently the average distance from the nostril to the stomach. "The double tube (Kniseley's) is also 10 feet long, is double for 7 feet, and has the balance in two separate tubes. Where double, the parts are vulcanized together. The separate tubes consist of—(1) one with a small opening ($\frac{1}{4}$ inch in diameter), through which water is pumped into the stomach by means of a continuous-flow pump; (2) the other tube is larger ($\frac{1}{2}$ inch in diameter), and is the outlet through which food and gases will escape from the stomach" ("Veterinary Therapeutics," p. 822).

Some prefer the single tube, others the double; some use a stilette to keep the tube rigid, others do not. Again, there is a difference of opinion as to whether the nasal or oral route should be used, but the writer is well satisfied with the single tube, minus the stilette, and the nasal route, preferring, however, a smooth rubber hose-pipe, which is more rigid and only $\frac{5}{8}$ inch in diameter. This can be used in a six months foal; for still younger animals a smaller tube would be necessary.

Technique of the Single Tube by the Nasal Route.—Restraint depends a great deal on the temperament of the patient as well as that of the operator. In many instances the tube can be passed single-handed, especially if the patient hangs back on his halter; if necessary, an assistant may hold the head firmly, the head may be tied closely to a pillar or ring, or a twitch on the nose or right ear for preference may be used, but the twitch has the disadvantage of distracting the animal's attention too much. The writer, single-handed, has many times in particularly quiet horses passed the tube, tied it to the head stall, and then pumped in the necessary fluids. Either nostril may be used, but the left is preferable, as the operator can more easily watch the progress of events. Should there be difficulty in passing the tube into the pharynx on one side, it will often be found quite easy on the other. When using the left nasal route, seize the wing of the nostril by the thumb and finger of the right hand and turn it well over. Pass the tube along the nasal floor with great care to prevent injury to the turbinated bone and its mucous membrane, with consequent hæmorrhage, which has been well described as alarming, but not dangerous. When the first mark reaches the nostril, keep the tube travelling, as there is invariably a swallowing movement then; one may have to wait a long time for the next attempt at deglutition.

Passage down the œsophagus can be followed by the eye in all but the very thick-necked horses, and is accompanied by a certain amount of resistance which increases towards the stomach, and a crackling sound due to eructation. The tube can also be felt behind the larynx by approximating the finger-tips of both hands and palpating across the œsophagus. Should the tube enter the trachea there is an absence of the above, and the animal breathes through the tube, *but, and this is extremely important, he does not necessarily cough.*

Extraction should also be carefully carried out in an upward direction to keep the point of the tube down, and thus prevent injury and hæmorrhage. During both insertion and extraction the head should be kept as still as possible. Slippery elm bark as a lubricant is recommended, but the writer simply wets the tube with water.

It may be here stated that the risks of conveying infection from one horse to another are very great, and that to avoid these disinfection by immersion in 1 to 500 perchloride of mercury solution appears to be quite satisfactory; also the deleterious effects of oil can be prevented by washing in ordinary salt and water.

Technique of the Double Tube.—While the single tube may also be used through the mouth, the double must, as it is too large for the nasal route. Some prefer the gag, but Treman advises drawing a small strap tightly round the nose just high enough to avoid interfering with respiration, and passing the tube through the interdental space. By this means breathing is less interfered with than when the gag is used, and the patient does not resist to the same extent. (Rewritten from "Veterinary Therapeutics.")

The Tube as Diagnostic Agent.—The writer was able on one occasion to detect stricture of the œsophagus 6 inches from the pharynx; the usual symptoms were not shown. A foul smell from the stomach in a case of tetany pointed to that organ being the seat of the trouble. It is also his practice in every colic case to pass the tube into the stomach, and so gastric tympany is never overlooked. Should the animal show great uneasiness after 2 gallons or so have been passed into the stomach—this is often of a very temporary nature and soon passes off—it is evident, except when it is quite of short duration, that there is a serious obstruction somewhere due to impaction of the stomach, twist or impaction of the small bowel, cæcal invagination, or torsion of the double colon; these have been his experience. If, however, there is no return flow from the stomach on insertion of the tube into that organ, but constant repeated eructations of gas, and sometimes fluid, brought about by antiperistalsis, one can concentrate attention on some other part of the alimentary canal. In conjunction with general symptoms and a rectal examination, a more or less correct diagnosis can often be made, but his experience has been that in many cases the difficulties have been more clearly accentuated than ever—*e.g.*, ileo-cæcal invagination. Should the patient show no uneasiness while hydrotherapy is being practised, and afterwards signs of discomfort apparently due to over-distension only, the writer can with confidence give a favourable prognosis in most instances in his cases of "colic."

Early Diagnosis of Habronemiasis.—Hodgkins has made a notable advance in this disease, in that he has been able to diagnose this condition much earlier than heretofore.

His method briefly is this: Feed on mashes only for two days, and starve for thirty-six hours. Inject per stomach tube 3 to 4 gallons of hot water, wait a few minutes, and then withdraw the liquid by siphonage. If necessary, this should be repeated until the mucin and parasites come away, usually towards the end. The fluid from the stomach is strained through several thicknesses of blotting-paper supported by gauze.

This may lead to new methods of treatment for *H. microstoma* and *H. muscæ*, but it is difficult to see how *H. megastoma* safely ensconced in the submucous abscess can be satisfactorily dealt with (*Veterinary Journal*, August, 1921).

Uses of the Tube.—Gastric tympany is at once removed by the aid of the tube, and impaction of the stomach can be relieved by alternatively pumping in water—Merilatt prefers that the temperature of the water should be 110° F.—and siphoning it out again; the return flow is begun by intra-abdominal pressure. This process is repeated until the fluid ceases to return.

Gilyard claims most successful results in impaction of the rumen by inserting the tube well into the food mass, and pumping in as much as 20 gallons of warm water containing saline purgatives (Campbell, "Colics and their Treatment," p. 99).

In the writer's practice the drenching bottle has been discarded, and along with it to a great extent that instrument of torture the twitch. In all cases where internal medication in the horse is indicated the tube is used, and very often, too, the cow is similarly treated—in her case, with the aid of a gag, the oral route is used; one may dispense with the gag, but the bovine is particularly adept at getting the tube between the molars, with disastrous results.

Saline Solution: Is tonic, febrifuge, alterative, solvent, diluent, neutralizer, and eliminative. *Dose* (horses, cattle, and camels): Sodium chloride, 8 to 12 ounces in not less than 2 gallons of water.

In the writer's opinion saline as a tonic holds pride of place; hydrochloric acid is given off in large quantities, and all glandular secretions with their beneficent actions appear to be considerably augmented. Mucus is evidently dissolved freely, with the result that bacteria and their toxins are eliminated to such a degree that diarrhœa, for example, is often successfully treated by saline solution alone. The results in many cases of debility in horses, cattle, and camels, due to known and unknown causes, are really remarkable—excellent appetite and a rapid increase in weight. It would now appear that many debility cases amongst the army horses in India which responded to treatment were cases of habronemiasis which got a respite as the result of a course of treatment. It was found that a 5 per cent. solution had a considerable vermicidal action—bots, for example—but this strength often proved dangerous to the horse; it may be, however, that 2½ per cent. solution—that commonly used—had a certain inhibitory action. In cattle practice the 5 per cent. solution may prove of value in certain parasitic infections.

Perhaps the most valuable lesson received in the use of saline is the extreme value of *elimination* of devitalized material, the pabulum of many pathogenic organisms. Generally, there is considerable thirst, in all probability due to excessive gastric acidity—the addition of bicarbonate of sodium nullifies the thirst—with the result that enormous quantities of water are drunk, and no one can gainsay the value of this flushing of the system. Sodium chloride in food, even in the same quantity as prescribed in solution, has no similar action, probably owing to decomposition during the process of digestion. Further, small repeated doses in solution are not so beneficial as one large one, which suffices for twenty-four hours.

The equine patient, too, recovers with great rapidity from the effects of chloroform anæsthesia—neutralization of the chloroform—if given saline immediately operative measures have ceased. At the same time a word of warning must be given where chloral hydrate has been given as a narcotic for operative purposes; the combination of chloral and saline is highly dangerous, owing to the high incidence of hypostatic pneumonia following, due, according to a medical authority, to the fact that narcotics increase the permeability of lung tissue and, of course, saline further accentuates it. Should, however, saline after chloral hydrate be indicated, the usual solution—*i.e.*, sodium chloride 8 ounces, water 2 gallons—may be safely administered if given in 4-pint doses every hour. Twenty-four hours later there is no danger.

In cattle practice saline may be given per tube through the mouth, or if more expedient in 4-ounce doses in drinking water. The camel takes his in the usual way—has it poured in from the bucket.

In hot countries like India, the existence of lichen tropicus (prickly heat) in the horse is an unfortunate circumstance, as saline increases its severity; it may even act as an exciting cause.

The physiological treatment of wounds, bruises, etc., by saline internally is accompanied by the most gratifying results. Pain—the solution is a valuable anodyne—and swellings are rapidly decreased, and wounds do extraordinarily well, while the risks of sloughing are considerably reduced, for example, in broken knees; the flow of serum is very much increased. Scrotal swelling following castration subsides rapidly, and the writer's experience is that greater liberties can be taken with the peritoneum. To illustrate this a rig case may be cited—operation by the inguinal canal—in which a large vein was accidentally detached and stretched across the inner ring, and under which the bowel repeatedly became incarcerated. The abdominal cavity was entered by the hand through the operation wound seven times in five days, on each occasion after exploring the inner ring from the rectum. Of course, the hands were well washed with antiseptics, but it is not contended that asepsis was complete. It is only fair to add, however, that formalin was added to the saline solution.

Very successful results, too, have been obtained by the administration of large quantities of saline in cases of excessive hæmorrhage.

Inspired by Imrie, an authority on the therapeutic action of formalin, Curbishley, in an article on auto-intoxication complicating serious gastric intestinal diseases, and by Saunders, an advocate of hydrotherapy, the writer has adopted saline solution and formalin (1 to 2 ounces) in his so-called colics with phenomenal success. The normal actions of the alimentary canal are soon restored, there may or may not be a laxative action, other medicines given can be ignored, and the treatment is perfectly safe for in-foal mares. Further, no case of twist has supervened in the writer's practice after treatment has been given, pointing to the conclusion that disordered nervous and muscular action may be due to irritant toxins of bacterial origin. Many believe that in a strangulated bowel toxins are freely formed; the offending organisms must have been previously in residence.

The once-dreaded impaction of the double colon now responds in practically every instance to sodium chloride 8 ounces, formalin 2 ounces, water 12 gallons. This should be given slowly, and, provided no discomfort is shown other than that due to a high degree of distension, one can with confidence prognose a satisfactory ending, even to telling the owner that his animal will be fit for work again on the following day.

Impaction of the cæcum is similarly treated, and if treatment is begun early good results may be anticipated.

Irritating Medicines in the Trachea of the Horse.—In these unfortunate accidents saline and formalin solution has proved of great value, and as an illustration two cases may be cited:

(1) *Thoroughbred in Training.*—Choked after a gallop, and was given a pint of water by the groom; coughed badly; owner then appeared and attempted to administer linseed oil, with the result that the coughing was more distressing than ever and some of the oil was returned through the nostrils.

Found the animal to all intents and purposes in a dying condition, pulseless, membranes blanched and cyanosed, quick catchy respirations, haggard expression. . . . Prognosis very grave. Administered saline and formalin, supplementing these by liquor strychnine subcutaneously. Patient quite well next morning, and has since won races.

(2) *Horse choked by Linseed Oil.*—Four days later temperature 108·4° F., pulse 96, and extremely rapid respirations. Recovery was practically complete in two more days.

The parasitic affections—equine piroplasmosis and bursattee, both of them hitherto of a most intractable nature—respond to saline solution with antimony tartrate (3 drams) given daily. In the former the temperature soon subsides, the icteric symptoms rapidly disappear, closely followed by the petechial spots, and convalescence is an accomplished fact in a few days. Within a few weeks the patients are again in excellent condition, whereas with previous treatments, in cases where death did not supervene, debility, sometimes of twelve months' duration, could be anticipated.

In bursattee the swelling quickly subsides, followed by sloughing of the " cunkers."

An important action of saline is that of preserving oil and aloes if given at the same time. The result is that there is neither purging nor nausea, and in the case of the former one gets a lubricating action similar to that of liquid paraffin. This discovery led to the adoption of saline and linseed oil in combination for cases of sand and grit in the bowel of the horse, with excellent results. To separate the sand from the fæces a good plan is to place the evacuations in a bucket and turn on a water tap; the fæces are floated out, leaving the sand and grit behind.

How long the preservative action of saline remains in the alimentary canal is now known, as an experiment patient received oleum lini (1 pint) in saline for five days and oil alone on each four succeeding days—a total of 9 pints in nine days—without being purged or nauseated. It may be that saline has the property of preserving other drugs from decomposition, and acting as a carrier of drugs unaltered into the bloodstream.

Finally, useful as the tube is in the horse, there are indications that cattle practice will also be considerably improved by the more general employment of this indispensable instrument.—*W. W. Lang.*

STOMATITIS.

Catarrhal.—The cause, where detected, should be removed. It may be due to irritant poisons, scalding with too hot foods, irritating foods, traumatism, etc. A purgative should be administered, and the mouth washed out night and morning with a solution of peroxide of hydrogen, chlorate of potash, alum, or permanganate of potash. The best means of flushing the mouth is by an ordinary human enema syringe, attached to the nozzle of which is a metal tube 6 to 9 inches long with holes perforated along the tube wall. Sloppy foods should be ordered during the acute stage.

Fungoid.—Foals and calves are the most common victims of this condition. A saline aperient having been given, the following powder is thrown into the mouth (where the actinomyces is the fungus present, treatment for actinomycosis is called for):

℞	Acidi Borici	grs. x.
	Potassii Chloratis	grs. xv.
	Sodii Chloridi	ʒii.

M. Ft. pulv. One powder on the tongue night and morning.

The patient, if not sucking the dam, should be fed on slops for some days.

Pustular (Contagious).—The affected animals must be separated from the healthy, and all drinking and eating vessels disinfected. An aperient having been given, the mouth is washed out once or twice daily, similar to that recommended for the catarrhal form, and a sloppy diet ordered during the painful period.

Ulcerative and Vesicular.—Treatment is practically on the lines advocated for the catarrhal form.

STRABISMUS.

Squinting in animals is indeed a very rare condition. It may affect one eye only, but most commonly both eyes are affected, and usually each squints at the same angle. If the animal is young, the eye is not very amblyopic, and treatment is decided upon, training the affected eye may be tried by applying *to the healthy eye only* a little atropine ointment, 5 grains to the ounce, once daily. If this fails to effect a cure, tenotomy is called for. This is comparatively easy, but, owing to the sensitive nature of the structures, manipulative surgical delicacy is very essential. The patient properly secured, large animals of course being cast, the head is held very firmly so that movement is impossible. An eye speculum having been inserted, the eye is irrigated with a weak solution of boric acid (5 grains to the ounce), and anæsthetized with cocaine. If the squint is inward, the conjunctiva at the inner canthus is picked up with a fine pair of forceps and snipped with sharp pointed scissors. The blunt strabismus hook is then passed through the wound thus made, and the aponeurotic portion of the internal rectus muscle attached to the sclerotic coat of the eyeball hooked, pulled slightly outwards, and snipped off by the scissors. If the squint is outward, a similar operation is performed on the external rectus muscle. The after-treatment consists of dropping into the eye twice daily weak boric lotion 5 to 7 grains to the ounce. The after-results may be satisfactory, but improvement may not be immediate. On the other hand, improvement may be noted after the operation, and in course of time the squint may become as before the operation. Unfortunately, we are not in a position to educate our patients to exercise the eye by lateral rotations. After operation, however, in one case of a pedigree bull calf suffering from bilateral internal squint, the writer devised a wooden board fixed to the patient's horns and forehead, the ends of which reached so far over the optical region that *the larger portion of direct vision* was obliterated, while *lateral* vision was free. This and the operation succeeded in bringing about a nearly complete cure.

STRANGLES.

A specific infectious and contagious disease peculiar to equines.* Young horses are more susceptible to the disease than full-toothed animals. This fact may be accounted for on an immunity basis; at any rate, it is a well-acknowledged truism that an attack of strangles usually confers a lifelong immunity.

The writer has, however, formed the opinion that this degree of immunity may only be partly true, and inclines to the belief that the eruptive dental phases through which young animals pass form an excellent period for bacterial inoculation. The organism always present in strangles is the *Streptococcus longus*, and a morphological bacterium identical to this streptococcus is invariably present as a saprophyte in the oral and nasal cavities of equines. It is therefore quite conceivable that, given an abrasion in the mucosa such as occurs in teething, the saprophyte may become an active parasite, the infectious nature being due to the fact that the bacteria gain in virulence as they pass through the bodies of their successive hosts. Strangles running a normal course must be looked upon as a benign disease, Nature in herself being usually capable of preventing any serious ravages on the part of the bacteria, maintaining the disease throughout as a localized condition. So much is this recognized in practice that many practitioners will assert they get as good results by keeping their patients out at grass and doing nothing as they obtain from nursing and treatment indoors, irrespective of weather. While personal experience compels the writer to recognize these tenets, he would not go so far as to advocate this "survival of the fittest" doctrine as a routine measure, for the following reasons: Fresh air, natural surroundings, and natural food are important adjuvants in the treatment of all bacterial infections, but our British climate in the winter months is very variable. If the natural immune index of the patient is low, or if the bacteria belong to a potent strain and are powerfully aggressive, the second line of defence† may give way, the bacteria running riot, and irregular strangles or pulmonary lesions develop. To fortify these lines of defence is the prima facie policy of every practitioner by warding against chills, maintaining an even temperature and good hygienic surroundings, giving easily digestible food and plenty of fresh clean water, and as a general treatment prescribing agents which flush the eliminative organs, so that depressing toxic elements may leave the system as quickly as possible. These are included under one group—*i.e.*, salines: sulphate of soda, sulphate of magnesia, hyposulphate of soda, chloride of sodium, nitrate of potash, chlorate of potash. The abscess formations in the lymphatic glands should be fomented, a stimulating liniment rubbed in daily, and as soon as pus is in evidence lancing is required. The cavity is then irrigated with an antiseptic, and a small piece of common salt about the size of a filbert nut inserted. The pus thus evacuated is collected and its virulence destroyed by a strong antiseptic. Where there is evidence of sore throat—laryngitis or pharyngitis—treatment for these conditions is necessary. Where symptoms of dyspnœa occur, tracheotomy should be performed. Where pulmonary conditions develop, these must be treated accordingly (see Pneumonia, Bronchitis).

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* Some authorities assert they have observed strangles in cattle, pigs, and dogs, but their clinical data do not appear to have been supported by bacteriological investigation.

† The lines of defence may be divided into four general heads—*i.e.*, (1) Mucosæ; (2) local lymphatics; (3) lymphatic system (general); (4) blood-stream.

Sero-Vaccine Therapy.—When the disease is not running a normal course, when a vicious circle has become established, or when the patient is a valuable one and it is not desired to take undue risks, 30 c.c. of anti-streptococcal serum should be immediately injected, and repeated every day until signs of improvement set in. Under this treatment the temperature usually falls, the auto-intoxication is reduced, the catarrhal discharge becomes thicker in quality and less in quantity, and the appetite improves. On the third day after giving the serum, time has been allowed, provided pus can be collected, to make an autogenous vaccine; the writer combines the serum and vaccine, the doses working out as follows: First day, serum; second day, serum; third day, serum c. vaccine; fourth day, serum; fifth day, serum c. vaccine; sixth day, serum; seventh day, serum c. vaccine; eighth day, serum; ninth day, serum c. vaccine; tenth day, serum; eleventh day, vaccine.

Serum treatment, when it has to be used in a number of animals, is an expensive matter, and on economical grounds, unless in special cases, can be dispensed with. These special cases are very valuable animals, or animals which are so extremely ill that the negative and active phase of a vaccine would tend to culminate in hastening dissolution instead of retarding it. In mild or moderate cases vaccine therapy should be relied upon in general practice. In the mild cases full doses should be given from the outset, and repeated every four, five, or six days, the severer cases being treated with minim doses, the first dose or two perhaps being guarded with serum given jointly, and repeated every forty-eight hours until a marked improvement sets in.

Prophylaxis.—The diseased should be separated from the healthy, the drains flushed with disinfectants, the ventilation made good where it is defective, the mangers and buckets disinfected and all discharge destroyed, common drinking troughs emptied and disinfected. Where the disease takes on a virulent type the healthy animals should be vaccinated, one dose of vaccine given every five or six days, three doses in all usually being sufficient. During the initial vaccination the vaccinated animals must be kept as far away from the infected area as is practicable. Finally, it may be pointed out, if sero-vaccine therapy was more rationally and systematically carried out as a routine practice, we should hear less of roaring and whistling among hunters and race-horses.

STRINGHALT.

This neuro-muscular condition usually affects one hind limb, but it is not uncommonly seen in both. The disease tends with age and work to become progressively worse; therefore, the sooner treatment is undertaken the better, as a rule, are the results. The exact pathology being unknown, treatment must be largely somewhat empirical. Various methods of treatment have been adopted from time to time, and invariably discarded. The operation which has given the writer the best results consists of resection of the tendinous prolongation of the peroneus muscle. The tendon is found just below the hock-joint on the outer aspect of the metatarsus before it joins the extensor pedis. At this point it can be easily felt by the fingers, when pressure is applied to it, as a rolling cord immediately under the skin. The operation may be done standing, but the writer prefers to cast the animal. If standing, a local anæsthetic should be injected, the nose twitched, and the fore leg picked up. The hair having been clipped or shaved, the skin is painted with iodine, and an incision about $\frac{3}{4}$ inch long made in the skin over and parallel to the tendon, the fascia severed, a sterile tenotome passed sideways between it, and the bone and the tendon cut. The wound is painted with tincture of iodine, a single suture inserted in the skin, and painted with collodium.

No further treatment, if the operation has been performed under sterile precautions, is necessary, the patient being turned out to grass. Immediate improvement may follow, improvement may be deferred for weeks or a month or two, or there may be no alteration of the unsightly action.

Out of twenty cases operated upon by the writer twelve completely recovered, four were improved, and four derived no benefit. The improvement was immediate in nine of the cases. In none of the cases were any untoward sequelæ noticed.

STUTTGART DISEASE.

Treatment for this condition is largely symptomatic, and it must be confessed somewhat empirical. If the case is seen early, a dose of medicinal paraffin should be given, followed by a $\frac{1}{4}$-grain calomel night and morning for three or four days. If the bowels are very offensive, the well-known quinine and chlorine mixture has given the writer favourable results. It is prepared thus:

Take 40 minims of strong hydrochloric acid and pour it on 30 grains chlorate of potash; add 12 ounces water gradually, shaking at intervals, so that the liquid will absorb the chlorine gas as it forms. After the potash has been all dissolved add 24 grains of sulphate of quinine, shake, and the mixture is ready for use.

The dose varies from a teaspoon to a dessertspoon, according to the size of the dog, three times a day.

Another very useful combination is:

℞ Bismuthi Subnitratis	grs. v.
Sodii Chloridi	grs. xii.
Sodii Bicarbonatis	grs. x.

M. Ft. pulv. One powder three times a day.

If the patient does not improve, an acid mixture should be tried.

℞ Acidi Hydrochloridi Dil.	♏v.
Acidi Citras	grs. vii.
Glycerini Aquæ	q.s. ad ʒss.

M. Ft. haust. Two teaspoonfuls three times a day.

When the heart shows signs of failure, brandy in small doses repeated often is strongly recommended. In all cases normal saline solution* should be injected every other day, varying from 8 or 10 ounces to 1 pint according to size, and to this should be added 1 to 3 grains proflavine. The injection is made in one shoulder and then in the other under sterile precautions. The injection of saline solution by a long tube passed into the posterior bowels also helps to get rid of active bacterial elements.

If there is much nausea and vomiting, the following is advised:

℞ Morphia Hydrochloridi	gr. $\frac{1}{8}$
Ingluvin Bismuthi Subnitratis	āā grs. v.

M. Ft. pulv. Give one every five hours in a little water.

Musterole well rubbed into the epigastrium also often affords relief. When emesis is going on no food should be allowed for twelve or twenty-four hours, but a little ice may be placed often on the tongue, and kept there until it has dissolved.

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* Normal saline solution is made by adding one teaspoonful of salt to a pint of boiled water.

On the earliest manifestation of oral sepsis, the mouth must be thoroughly washed with normal saline solution to which is added 2 drams of citrate of soda to the pint, after which it is well irrigated with peroxide of hydrogen. As soon as indications of ulceration, necrosis, or sloughing, take place the affected parts should be dressed with the following:

℞	Acidi Carbolici	♏xx.
	Tincturæ Iodini	ʒss.
	Glycerini	ʒi.

M. Ft. lotio. To be applied to the affected area with a camel-hair brush night and morning.

Vaccine Therapy.—In the present state of our knowledge, as in distemper, one is tempted to conclude that the causal factor is an ultramicroscopic virus, and that ovoid bacilli, *B. coli*, and streptococci are secondary elements. Nevertheless, it is to these secondary infective bacteria that we must look for causing the gross morbid lesions, and it behoves us, as up-to-date practitioners, to immunize by vaccine therapy our patients against these destructive agents.

If an animal is likely to die, and there are others affected, it should be killed, so that *materiès* may be obtained from the heart, blood, spleen, liver, kidneys; also blood-capsules should be taken from patients in all stages of the disease, a careful examination made, the bacteria isolated, noted, and from these vaccines made. The initial dose should be small, the reaction (if any) noted, and repeated, gradually increasing the dose, every forty-eight or seventy-two hours according to circumstances. If the animal lives until three or four injections have been given, a recovery may be anticipated.

Diet.—This is an important item. The gastro-intestinal mucosa being in a state of active irritable catarrh, food almost of any kind appears to act as an irritant, so that for the first day or two, at least, all food should be withheld; in fact, until the irritable condition has been somewhat reduced by the sedatives prescribed above. When this stage is reached, whey and barley gruel make the most tolerable nutrients; next comes peptonized milk. If these are not retained, then the strength should be maintained by rectal feeding of whey or peptonized milk. After a time Glaxo, Benger's food, Mellin's food, etc., may be given, and when solids are indicated tripe, fish, chicken, and a little raw scraped mutton may be allowed. In the writer's opinion *meat extracts* in any shape or form are absolutely contra-indicated. Their ingestion augments bacterial growth in the digestive system, and, what is perhaps more important, clog up the liver and the eliminative organs.

When convalescence sets in, a course of tonics should be prescribed, such as the compound syrup of hypophosphates or syrup of ferri phosphates.

It is unnecessary to add that the surroundings throughout should comply with all the tenets embodied in perfect hygiene.

SUFFOCATION.

When an animal's life is threatened with suffocation, the cause must be ascertained and, where possible, removed. It may be due to obstruction arising from both nostrils, particularly in the horse, whose soft palate is so long that oral respiration is most difficult. The obstructive elements may be accumulated pus or diffused tumour formations, to remove which trephining is necessary (see Sinus, Diseases of). Before this operation, however, is undertaken, tracheotomy must be performed. In extensive disease of the larynx and pharynx, with abscess formations, the animal may become wellnigh suffocated, to relieve which the trachea must be opened.

Acute œdema of the glottis and epiglottis, coming on suddenly, demands equally heroic measures to save life, and so also the presence of foreign bodies, tumours, etc., in the laryngo-pharyngeal region. Neoplasms in the trachea often obstruct the ingress of air, and if in the cervical region a tube should be inserted below their seat, the trachea opened, and their removal effected surgically. If they are located in the thoracic region, or if obstruction is due to pressure from without, as, for example, in those cases of tuberculosis or other malignant diseases of the mediastinal glands, treatment is of no avail, and the animal should be destroyed. When suffocation is threatened as a result of pressure upon the lung parenchyma—for example, in hydrothorax—tapping the chest is demanded, relief of the dangerous symptoms being immediate.

SUNSTROKE.

In very warm summers it is no uncommon thing to find animals suffering from sunstroke, the horse and the pig probably being the most common victims.

Removal of the patient out of the direct effect of the sun's rays is an item of first importance, and if it can be placed in a cool atmosphere so much the better. In the case of the horse at work all harness, especially the collar, must be removed, and if the pulse is full and bounding bleeding from the jugular is advised. Cold water should be dashed about the head or, better still, when procurable, ice packs applied to the poll and neck. A full purgative is then advised—for the horse, aloin and calomel; ox and pig, sodium sulphate and calomel; dog, calomel and podophyllin. The diet for several days must be light and digestible, and in the case of working animals the collar made a perfect fit, and a sun-hat lined with red should be worn on hot days.

SUPERPURGATION.

This may be due to the effects of an overdose of cathartic medicine; to the irritating influence of very succulent herbage, particularly clovers. roots, such as mangels (over-ripe or under-ripe), potatoes, etc.; to over-excitement in the hunting-field, commonly seen in young, well-bred hunters. When it is due to catharsis the patient should have a dose of tincture of chloroform et morphia, 3 drams; prepared chalk, 1 ounce; bicarbonate of soda, 1 ounce; repeated two or three times a day in a pint of flour gruel.

If there are colicky pains a hypodermic injection of morphia is advised. A limited supply of chilled water should be allowed. If the animal becomes exhausted and the extremities are cold, the body must be well rubbed, clothed, the legs bandaged, and a diffusible stimulant—such as aromatic spirits of ammonia, 1 ounce; turpentine, 1 ounce; oil of amber, 1 ounce; ether, 1 ounce—should be given in a pint of flour gruel. In the event of tympany becoming a prominent symptom, tapping the rumen in the ox or the bowel in the horse, as the case may be, should be carried out. When the condition is due to deleterious dietetic material, in addition to the above treatment, and as an initial step, 1 to 1½ pints of linseed oil should be given, along with 2 drams of camphor and 1 ounce of chloral hydrate.

SUPPRESSION (URINE).

Suppression of urine is seen as the result of organic disease of the kidneys or mechanical obstruction in the ureters. Treatment to overcome the condition largely depends upon the degree of suppression. If it is complete, therapy is of no value; when it is partial, some relief may be obtained by directing a hyperactivity of secretion along the other excretory channels—*i.e.*, the skin and bowels—by giving purgatives and diaphoretics. For the latter, the most prompt are pilocarpine and normal saline solution subcutaneously. A mustard plaster should be applied to the loins, or in small animals musterole.

If symptoms of heart failure set in, cardiac stimulants, such as ammonia, ether, digitalis, are indicated; while subcutaneously camphor, strychnine, or digitalin and sparteine are advised.

The animal should have an abundance of water and demulcent drinks, chief of which are barley and linseed gruels.

SURRA (CAMEL).

The treatment with which the writer has obtained the best results is by the intravenous injections of 1 per cent. solution of tartar emetic on alternate days. An average-sized camel tolerates the following doses:

First day: 50 c.c. of a 1 per cent. solution. One day interval.
Third day: 100 c.c. of a 1 per cent. solution. One day interval.
Fifth day: 150 c.c. of a 1 per cent. solution. One day interval.
Seventh day: 150 c.c. of a 1 per cent. solution. One day interval.
Ninth day: 200 c.c. of a 1 per cent. solution. One day interval.
Eleventh day: 200 c.c. of a 1 per cent. solution. One day interval.

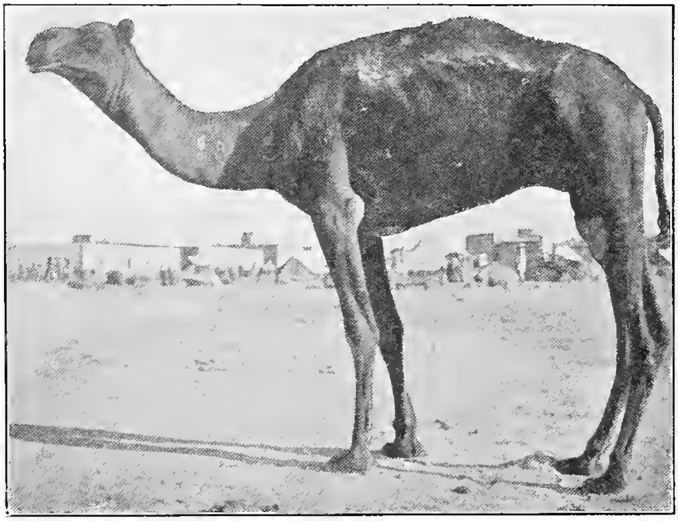

FIG. 168.—CAMEL SUFFERING FROM SURRA.
(Cross, "Diseases of the Camel.")

Thirteenth day: 200 c.c. of a 1 per cent. solution. One day interval.
Fifteenth day: 200 c.c. of a 1 per cent. solution. One day interval.
Seventeenth day: 200 c.c. of a 1 per cent. solution. One day interval.
Nineteenth day: 200 c.c. of a 1 per cent. solution. One day interval.
Twenty-first day: 200 c.c. of a 1 per cent. solution. One day interval.
Twenty-third day: 200 c.c. of a 1 per cent. solution. One day interval.
Twenty-fifth day: 200 c.c. of a 1 per cent. solution. One day interval.
Twenty-seventh day: 200 c.c. of a 1 per cent. solution. One day interval.
Twenty-ninth day: 200 c.c. of a 1 per cent. solution. One day interval.
Thirty-first day: 200 c.c. of a 1 per cent. solution.

The first injection should be given when trypanosomes are absent from the peripheral circulation and the temperature is low; if the drug be injected during the paroxysm, fainting, and in some cases even death, may result from comparatively small doses—*e.g.*, 50 c.c. of a 1 per cent. solution; but if the injection be made when the peripheral circulation is free from trypanosomes, doses up to 200 c.c. of a 1 per cent. solution are usually well tolerated.

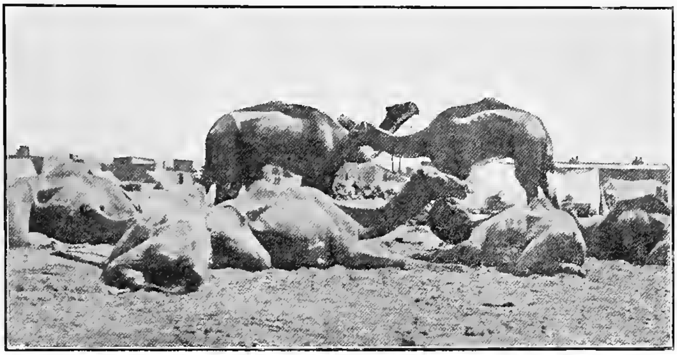

Fig. 169.—A Group of Surra Camels, showing the Wasting of the Muscles of the Hind Quarters.

(Cross, "Diseases of the Camel.")

The tartar emetic should be dissolved in distilled water, the solution filtered, and injected very slowly at blood-heat. Freshly-prepared solution must always be used.

The most suitable apparatus for giving the injections is Ehrlich's injection flask, fitted, as seen in the diagram, with indiarubber tube, glass tube, and needle.

If any of the solution is injected subcutaneously, swelling and suppuration will result.

When the needle enters the vein the blood will be seen in tube A; the dose of tartar emetic is then poured into the flask B; the indiarubber tube must now be squeezed to get rid of any air, the solution is allowed to flow into the blood-stream, and when nearly the whole of the dose has entered the blood a little normal salt solution is poured into the flask B

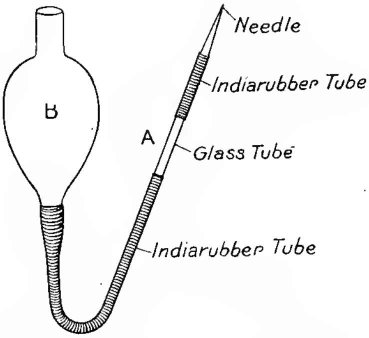

Fig. 170.—Diagram of Instrument used for injecting Tartar Emetic Solution.

and allowed to flow into the blood-stream, the needle being then withdrawn.

If no salt solution is injected after the tartar emetic, a drop of tartar emetic may enter the tissues when the needle is being withdrawn, resulting in suppuration and swelling; but by the injection of a small quantity of salt solution after the tartar emetic this danger is avoided.

If after any injection the camel is off feed, no further injection should be given till the camel is again feeding well, and the next dose should be slightly decreased; if the decreased dose is well tolerated, a full dose may then be given in the next injection.

The dose must therefore be regulated in accordance to the manner in which the camel is "standing" the injections.

The best way to determine how the camel is "standing" the injection is to note how the animal feeds. The injection should be made in the afternoon. The camel should be fed in the morning with a small quantity of grain, then sent out for exercise or browsing, and again fed with grain and bhoosa in the evening. Water should be allowed *ad lib.*

During the course of the treatment, if the camel becomes constipated, he must be treated with Epsom salts in doses of 1½ to 2 pounds. Sometimes diarrhœa (occasionally bloody diarrhœa) results from the injection of tartar emetic; in such cases 2 to 3 ounces of chlorodyne or camphorodyne should be given, and no further injection should be given till the condition of the camel is normal. In some camels quivering of the muscles of the hind quarters a few hours after the injection is given is observed, but this symptom disappears after a few hours and needs no special treatment.—*H. E. Cross.*

SWEATING (EXCESSIVE).

Practitioners are not often called in to prescribe for this condition; nevertheless, in some cases the condition may have a depressing effect upon the animal, which in turn injures its general utility and health. Horses working with excessively thick coats are never dry, and are liable to suffer from colic; cattle housed in overheated and overcrowded pens do not fatten. Animals out of condition are more liable to sweat than those which are "fit." Treatment, therefore, is obvious, consisting of clipping; ordering healthier surroundings; giving a rich, dry, nutritious diet, combined with a course of tonics such as iron, cinchona, gentian, nux vomica, and gradual increasing exercise.

SWINE ERYSIPELAS.

Medicinal treatment is usually futile, but no harm will attend a purgative dose of calomel, followed the next day by a dose of sulphate of soda. If the case is acute and taken sufficiently early, a full dose of immune serum—20 to 30 c.c.—should be injected, and repeated daily until improvement sets in.

Prophylaxis.—It has now been conclusively proved that a pig can be made immune by injecting a rich immune serum, followed by virulent cultures of the bacillus, the immunity thus set up being more or less permanent (Lechainche's method). The affected should be separated from the healthy, and the buildings thoroughly disinfected, and so also the drinking troughs and food.

SWINE FEVER.

This being a scheduled disease, the private practitioner is not called upon to treat it.

SYNCOPE.

The animal should be laid out on its right side, the head being lower than the rest of the body, and strong ammonia placed on a rag or sponge held close to the nose. Cold water is dashed over the head, and, if necessary, for the horse, aromatic spirits of ammonia 4 drams, water 10 ounces, should be injected under the skin; and for the dog, 30 minims in 2 ounces of water. Saline solution, to which a little brandy may advantageously be added, should also be injected *per rectum*. When necessary, artificial respiration may be called for.

SYNOVITIS.

Acute.—The animal should be made to rest the affected joint as much as possible. In the case of the horse, by placing it in a stall and tying up short by the head, by slinging, or by applying a splint, and bandaging where practicable. Tension in the joint itself is relieved by giving a full purgative, by applying hot fomentations, and by rubbing in equal parts of belladonna liniment and white lotion. Local bleeding from a superficial vein near the joint may also be practised with advantage. After the acute stage has been reduced, gentle exercise is necessary to prevent a stiff joint from forming, also massage, and later the application of a biniodide of mercury blister is advised. If improvement does not follow and the anatomical arrangements of the joint permit it, Bier's treatment (which see) should be carried out daily. When the joint is much distended, aspiration under sterile precautions should be undertaken, and repeated as often as necessary. Following the operation pressure applied to the joint, when practicable, by means of an elastic bandage is most useful. If pus is present, the outlook is by no means hopeful; but if treatment is decided upon, the capsule is opened, the joint irrigated with proflavine and saline solution, after which a continual stream of hypochlorite solution is played into the joint. Ankylosis invariably follows, however, and in the case of the horse its economic utility is thereby greatly handicapped. When the joint is sufficiently healed, exercise, forcible bending to break down adhesions, massage, Bier's treatment, blisters, setons, and the actual cautery may succeed in fitting the animal for slow work.

Chronic.—Exercise on soft ground, repeated blistering, setoning, forcible flexion, Bier's treatment, and firing, may all be tried in rotation.

TAKOSIS.

A disease apparently peculiar to the Angora goat, and due to a specific micro-organism. Law states Mohler and Washburn have obtained good results by giving 1½ grain doses of calomel twice daily for two days, followed on the third day by:

℞	Acidi Arseniosi	gr. i.
	Ferri Sulphatis	grs. xii.
	Quininæ Sulphatis	grs. ii.

M. Ft. pulv. One to be given night and morning for ten days; then, after an interval of two days, repeat the same course.

Vaccination has recently been attempted, and the results obtained appear to be encouraging.

Prophylaxis.—The goats should be protected against climatic variations, carefully fed, placed in hygienic surroundings, and on the first symptom of illness the healthy segregated from the diseased (Moussu and Dollar).

TEETH.

Disease of the tooth proper, compared with that of man, is comparatively rare in animals. Occasionally cases of caries are, however, seen, and have been already noted in the text (see Caries).

Extraction.—The removal of a firmly-fixed molar in the horse is, as a rule, not a simple matter, but requires skill, manipulative dexterity, suitable instruments, and patience; but when the tooth is loose, as the result of alveolar periostitis, the operation becomes much more easy. The tooth may be removed in the standing position if the patient is not a restive one, and certainly this should be attempted before casting him. A twitch having been firmly applied and his hind quarters backed into the corner of the stall, a mouth gag is inserted and the tongue withdrawn, the right hand passed along the molars, and the tooth to be extracted carefully located. The long-handled forceps, teeth open, is then passed along the row of molars to the diseased tooth, which is grasped in the instrument and held secure. To make sure that the forceps are grasping the proper tooth, the hand should again be passed into the mouth and the tooth and forceps manipulated. The operator having satisfied himself he has the proper grasp, the tooth is loosened by moving the forceps laterally (right and left) several times, after which the arms of the instruments are levered up or down according to the situation of the tooth—upper or lower jaw. In carrying out this leverage, it may be necessary to adjust a fulcrum on the jaw. If the operator fails to extract the tooth by one set of forceps, he should try another shape and size, for failure may be due to the forceps being too large and resting too closely on the

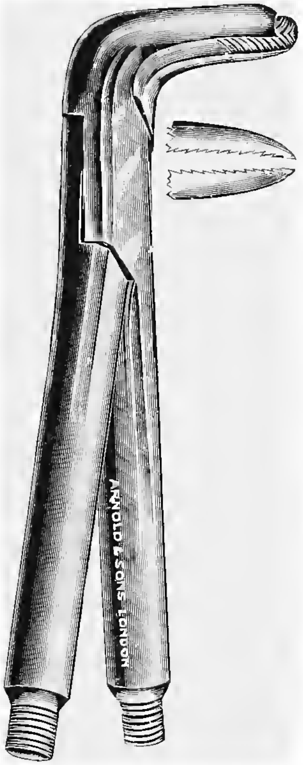

Fig. 171.—Tooth Extractor (for Roots).

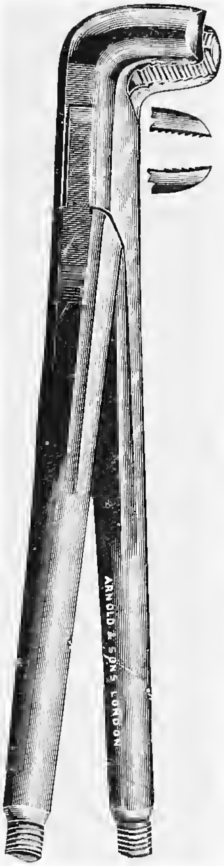

Fig. 172.—Tooth Extractor (Upper Molar).

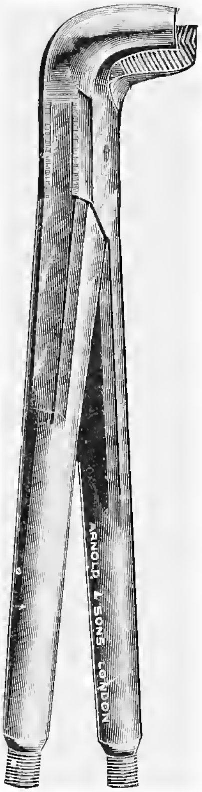

Fig. 173.—Tooth Extractor (Lower Molar).

tooth of the opposite jaw, causing cramped movement or no movement at all, or the crown may have disappeared, leaving a slanting surface, so that the forceps fail to grip, in which case an instrument with a serrated edge should be used, and, failing this, those with a somewhat sharp point are suggested, or the tooth may be jammed so tightly between its fellows that no lateral movement can be obtained.

If the surgeon feels handicapped by the resentful attitude of his patient, he should be cast. When every effort to remove the tooth has failed, there is no other alternative than to chloroform the animal and remove it by "punching." The first three molars of the upper and lower jaw are easily accessible, the fourth is somewhat difficult to reach, while the fifth can only be got at with considerable difficulty. The sixth tooth, by reason of its posterior situation, is practically out of the reach of the "punching" operation. The mouth gag having been inserted, a definite location of the affected tooth is made by the finger of the hand pressing out the cheek opposite the tooth and the point noted. The skin is incised, the bone laid bare, and trephined (see Trephining) directly opposite the root of the tooth. If a lower tooth, the seat of operation, of course, is the edge of the jaw-bone, care being taken not to injure the submaxillary vessels. In the case of an upper tooth, the inexperienced operator is inclined to trephine too low down, and instead of obtaining an opening immediately above the fangs, he exposes the outer wall of the tooth, with the result another hole in the bone must be made higher up. A punch with a shoulder bend on it and a serrated end to keep it from slipping is the best for the purpose.

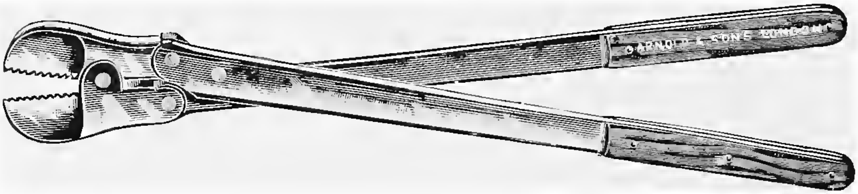

Fig. 174.—Tooth Shears. (Squair.)

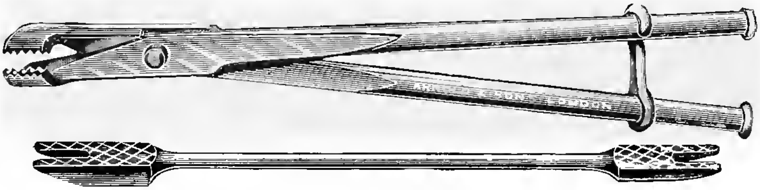

Fig. 175.—Molar Tooth Forceps with Levers. (Routlage.)

The punch placed against the root of the tooth, and held at the correct angle in a line with it, is given one, two, or three sharp taps with a wooden mallet—not metal. The tooth will either fall into the mouth, when the hand should be immediately inserted to remove it, or it may be so displaced that its extraction by forceps is easily effected. Throughout the operation an assistant should be deputed to hold the tongue, thereby preventing the risk of the animal swallowing the tooth.

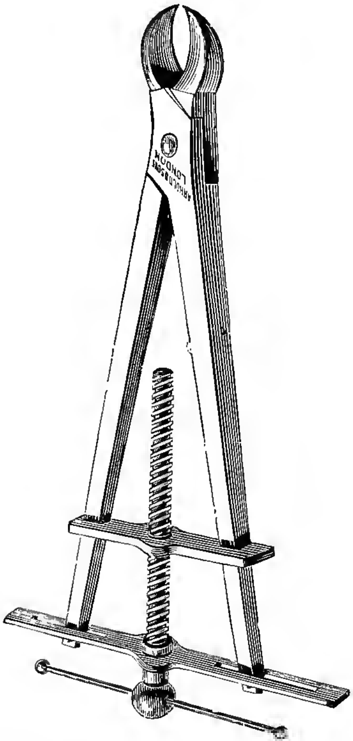

Fig. 176.—Tooth Shears for cutting off Extra Growths on the Tooth.

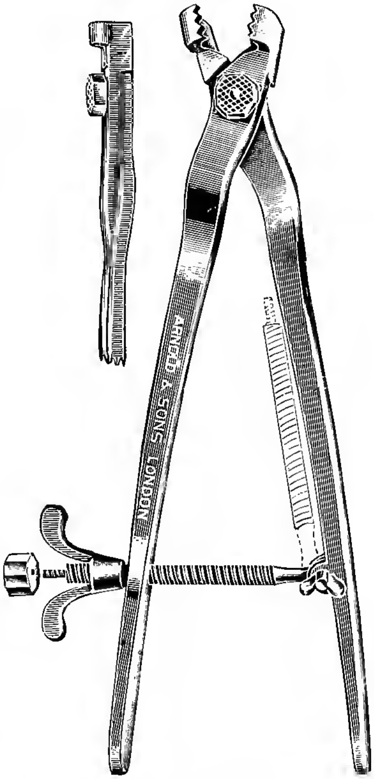

Fig. 177.—Molar Tooth Forceps. (Longhurst.)

After-treatment consists of removing spicula of bone in the tooth socket, if present, irrigating the cavity with an antiseptic, and packing every other day with gauze soaked in Lysol or peroxide of hydrogen. The animal should be kept on sloppy food for several days, care being taken to remove all food accumulation before each packing. In old horses the reparative process is slow, and the writer has had occasion in a few cases, after a week or a fortnight, to plug the cavity through the trephine opening with gutta-percha made quite soft by placing in very hot water and firmly inserting into the cavity. As a rule, the alveolus fills in in from three to six weeks. The trephined opening must be kept open until the cavity has nearly filled. This is best done by inserting a cork into the opening.

Irregularities.—These may be due to a variety of conditions:

1. Supernumerary teeth are seen, incisors as well as molars, with consequent displacement and deficient functioning of the table surfaces. In these cases, when one tooth is permanent and the other temporary, the latter, of course, must be removed to allow the permanent tooth to regain its proper position.

2. A tooth, particularly a molar, may outgrow its fellows, with the consequent result that it prevents the table surfaces from coming into close apposition. To remove this prominence the tooth shears are necessary, or a tooth chisel and mallet may be used. After removal of the protrusion in this manner, the roughened surface must be smoothed down by means of the tooth rasp.

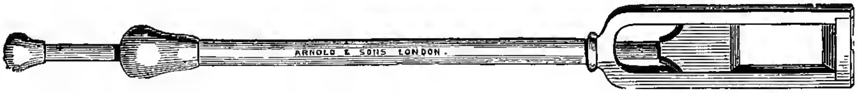

FIG. 178.—TOOTH CHISEL. (Gowing.)

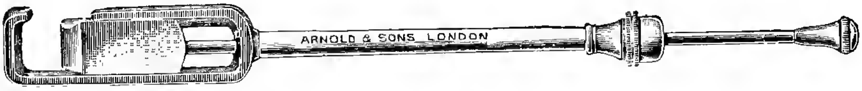

FIG. 179.—TOOTH CHISEL. (Caudwell)

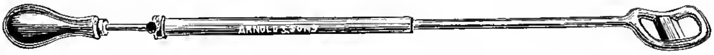

FIG. 180.—TOOTH CHISEL.

3. In horses the most common irregularity met with in practice is when there is excessive wear of the teeth tables and the production of sharp-cutting lateral edges—the inner edge of the lower jaw and the outer edge of the upper. These edges (the lower) cut into the tongue, the upper injure the cheeks, with the result that wounds form in these soft structures which cause painful mastication, culminating in so-called "quidding," and leading up to indigestion, diarrhœa, malnutrition, etc.

The remedy is as a rule simple and efficacious, and consists of rasping the edges down smooth with the usual tooth rasp; the only point to be remembered is that it is the inner edge of the lower jaw and the outer edge of the upper that require rasping.

To the inexperienced it may perhaps be well to describe the technique, simple as it is. A twitch is put on the upper lip, and a gag inserted in the mouth. The assistant holds the twitch with one hand, and draws the tongue out with the other.

The tooth rasp is now placed upon the edge of the molars and moved along the whole length, considerable pressure being applied until all sharp angles have disappeared along the border. This fact can now be ascertained by passing the hand along the edge. The other edges being treated in a similar manner, the operation is complete. The serrated wounds in the mouth rapidly disappear, and normal mastication soon follows. When considerable rasping is required, the dentine is liable to block up the depressions in the rasp, thereby reducing the degree of effectual rasping. This is easily overcome by dipping the rasp in a bucket of water at intervals, which should be at hand while operating. In those cases where the teeth are very soft it is often necessary to rasp the teeth once or twice a year to maintain easy mastication.

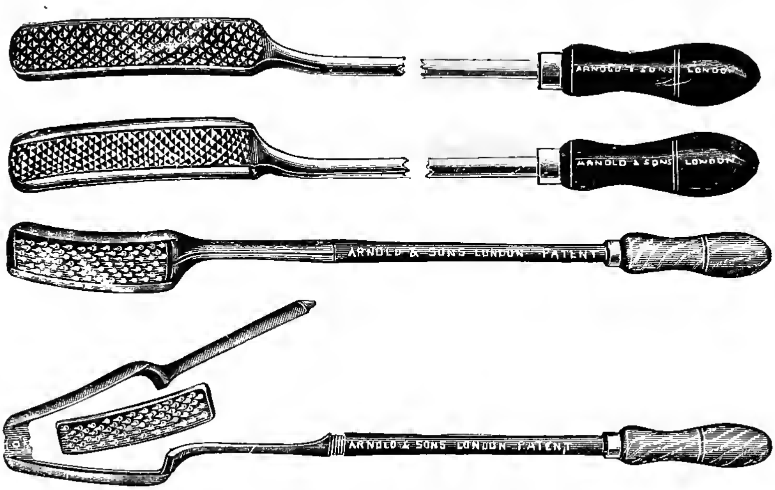

Fig. 181.—Tooth Rasps.

Tartar.—The accumulation of tartar on the teeth is most commonly seen in the dog, and usually old dogs.

In neglected cases the tartar accumulation is often excessive and very hard, so that some difficulty is experienced in its removal. The animal is securely held by an assistant, while the operator with a scaling lancet removes the deposit from each individual tooth by beginning at the edge of the gum and drawing the instrument towards the crown of the tooth. By working in this direction the risk of injury to the sensitive gum is obviated. Each tooth must have individual attention. When a tooth is loose it should be removed, and if pyorrhœa is present it too must be treated. After-treatment consists of brushing the teeth daily with a very hard tooth-brush dipped in peroxide of hydrogen.

TENDINITIS. *See* **Sprains.**

TENOTOMY.

As the result of severe sprains of the flexor tendons in the horse, or a continued series of sprains, the tendons during the reparative process shrink. In some cases the shrinkage is so great as to produce such pronounced leg deformity that the time arrives when the working capacity of the animal is so reduced as to make it useless. Advanced cases such as these usually call for surgical treatment. It must be pointed out, however, that during the transition stage, if the tendons still retain some of their elasticity and "knuckling over" of the fetlock is not too pronounced, less drastic measures than tenotomy should be tried. These consist of paring the heels low down and adjusting a shoe fitted with a long toe-piece, which projects 1 to 2 inches in front of the toe of the hoof. By these means an increase of leverage takes place, which is reflected upon the back tendons in the process of locomotion. With such a shoe the animal should be exercised upon hard ground. In addition, the tendons are well massaged with an emollient oil. Later, a blister or firing may be necessary before the animal becomes workably sound. Forcible stretching of the tendons is in some cases also beneficial. This is best done by passing a looped cord round the fetlock, bringing the end down behind the heel and forward under the sole. This rope is then drawn upon with force, the animal in the meantime resenting the traction, in the process of which the tendons are stretched. This operation should be repeated daily for some time. When all palliative measures fail, tenotomy must be performed. The patient is cast on the same side as the affected limb and chloroformed. If the animal is thrown out of doors, the leg is liberated from the hobble and loosely fixed by means of a rope to a crowbar driven into the ground. The seat of operation is a point equidistant between the knee and fetlock joints, and close to the anterior border of the flexor perforans tendon. The hair is clipped, the skin shaved and sterilized with tincture of iodine, and a small incision made at the point indicated above with a sterile lancet. The leg is now gently flexed, and a slightly bent, blunt-pointed sterile bistoury is passed through the wound, and with its flat surface resting on the anterior face of the tendon it is steadily forced inwards until the point is detected immediately under the skin on the opposite (namely, outer) side of the limb. The limb is now straightened and held tense, while the cutting edge of the bistoury is at the same time rotated to rest upon the tendon. By a steady sawing movement the tendons are now cut through and the lancet withdrawn.

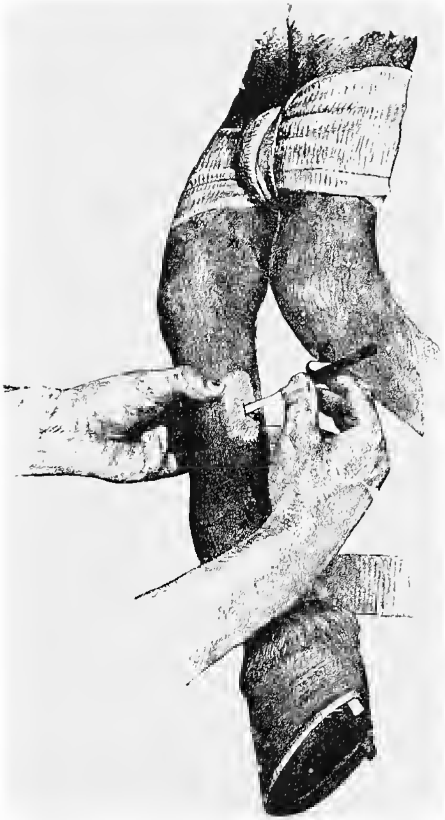

Fig. 182.—Tenotomy: First Stage.
(Dollar's "Regional Surgery.")

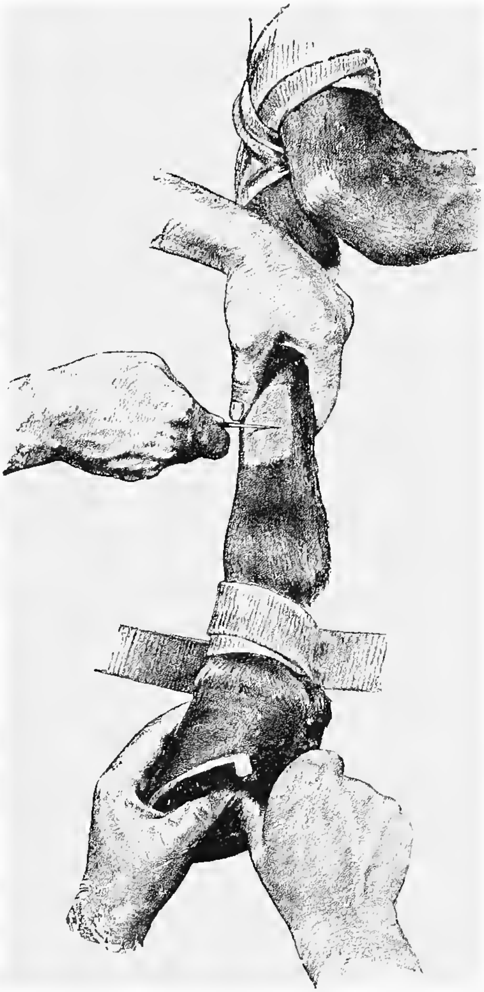

Fig. 183.—Tenotomy: Second Stage.
(Dollar's "Regional Surgery.")

Proof of complete severance will be obtained by the fact that a hollow space under the skin now exists between the divided ends, coupled with a straightening of the limb. If there are no adhesions, immediate alteration of the angle of the fetlock-joint will follow. On the other hand, if the case is an old-standing one, the adhesions may be so great as to defy all force to break them down, or perhaps the suspensory ligament has shrunk to a great excess. In cases such as these no benefit will follow the operation, and the animal should be destroyed. If the adhesions are of moderate extent, forcible traction as a rule breaks them down, when the limb will regain a more normal angle. The wound having been dressed with tincture of iodine, it is sealed with collodium, covered with sterile wool, and bandaged, and the animal allowed to rise. In all probability, when weight is placed on the limb, the fetlock pad will almost touch the ground and the toe will point upwards. To the inexperienced this may appear disturbing, but no anxiety need be entertained. If after a few days the animal still bears weight to the same extent on the pad, a long-heeled shoe with small calkins and a cross-bar should be put on and forced exercise ordered. The shoe should be removed in ten days, and the animal made to walk without it, when it will be noted how far the pad comes to the ground. If there is an improvement on this point, it is a great temptation to leave it off, for it must always be remembered that the great tendency is in the healing process for the cicatrized tissues to shrink, leaving the tendons just as contracted as they were before. In fact, premature union of the divided ends of the tendon is one of the things to guard against. Although the operation is a comparatively simple one, especially to the experienced, there are minor pitfalls which, if overlooked, might end in failure. A recapitulation, therefore, of important points may not be out of place here:

1. Strict sterile precautions must be observed throughout.

2. The operation must always be performed from the inside, the object being to prevent injury to the metacarpal artery. Some authorities consider cutting the metacarpal artery a matter not of first importance. The writer looks upon such an uncalled for mishap as disastrous and dangerous.

3. Do not accidentally pierce the skin at the opposite side, nor in cutting the tendons injure any portion of the cutaneous covering.

4. Some authorities recommend section of the perforans only, leaving the perforatus intact, completing the operation if the partial one proves a failure. The writer considers section only of the perforans worse than useless.

5. If after the operation lameness persists irrespective of the fact that every effort has been carried out to break down adhesions, the only alternative is median neurectomy, and this should be carried out.

TETANUS.

To obtain a clear perspective of this disease, with its therapeutical limitations, a study of the pathogenesis of tetanus is of the first importance.

Tetanus is a localized infection accompanied by a more or less generalized toxæmia. In from twenty-four to thirty-six hours after a wound has become infected with tetanus bacilli, toxin forms, which in due course travels along the axis cylinder of the motor nerves, being largely absorbed by the end plates of those nerves or, according to some authorities, by the nerve lymphatics. It is probable that both channels may be the means of transmission. The toxin reaches the motor spinal ganglia from the inoculated side, and affects the ganglia on the opposite side, producing the well-recognized clinical data of *tonic* muscular spasm.

No sooner do the bacilli invade the wound than we may be sure that phagocytosis, both by the leucocytes and local tissue cells, takes place (positive chemotaxis), but unfortunately (and this point carries with it considerable clinical potentialities), owing to the potency of the bacterial toxin, etc., a repellent action upon phagocytosis soon follows (negative chemotaxis), which acts as a serious menace to recovery. One must accept it as a fact also that, owing to the toxin possessing antigenetic powers, Nature, very early in the infectious stage, begins to elaborate her own antitoxin. It is largely upon the joint successful efforts of these two primarily protective forces that many of the aided and unaided cases of recovery in practice depend. It is well known that the toxin possesses a great affinity for nerve cells, and on theoretical grounds the side-chain theory gives one a fair conception of what is supposed to take place. Briefly, the cell molecule possesses side arms or receptors; the liberated toxin molecules unite with these, and if the latter is sufficiently potent to destroy the cell molecules and a large number of cells are so acted upon, symptoms of tetanus will become manifest, and in grave cases dissolution may follow. On the other hand, the cell may not die, but may continue to throw out from its molecules many receptors, the production of which may be so great and so rapid as to cause overcrowding and lead to detachment. These detached receptors are thrown into the body fluids, and as free agents act as antibodies, their object being to unite with and neutralize any free toxin with which they may come in contact. It will therefore be seen that free toxin acts as a cellular antitoxic stimulant by the production and overproduction of side chains or receptors. We must therefore look upon tetanic intoxication as an autovaccination, demonstrating clearly the three well-known phases in vaccine therapy—*i.e.*, the negative phase, the positive phase, and the phase of increased resistance. In those very acute cases where the charge of toxin appears to be excessive, and where the patient does not survive the negative phase, the common clinical symptoms cannot altogether be summed up as arising from a generalized toxæmia. Rather, one must look to some idiosyncrasy in the patient—*i.e.*, anaphylaxis, or something akin to it. In many of these fatal cases, not all, the writer has noticed what appeared to be a marked diminution and even complete absence of phagocytosis and serous transfusion in the wound itself—namely, the absence of pus. Consequently, in practice he has come to regard it as a clinical fact that his best recoveries are to be found in those cases where the wound is large and the discharge abundant from the outset, as against those showing small wounds or scratches covered by dry and firmly adherent scabs. Of course, the fact that the organism is an anaerobe must also not be overlooked. The situation of the wound also carries with it a clinical significance. The farther it is from the central axis (horizontal or perpendicular) and the less vascular the injured tissues, the graver are the risks of infection and the less likely will Nature be able to combat them. One possible exception must be taken to this, that, in the case where tetanus develops from docking, the toxin has direct access to the spinal cord; yet here the surgeon has a great advantage, for by one stroke of the knife he can get rid of the fountain of infection. If this is done early, good hope of recovery will most surely follow.

Action of Antitoxin.—From the foregoing it will be seen that, as soon as tetanus infection has taken place, Nature begins to elaborate her own protective antibodies, and if the charge of toxin is not sufficiently potent to cause molecular, cellular, and systemic death, these elements gain in force as the disease cycle progresses, until a stage not only of immunity, but of hyperimmunity is reached; such cases may rightly be called mild, and require little or no piloting on the part of the attendant. On the other hand, where the bacteria and their products run riot, where the defensive mechanism is, so to speak, thrown out of gear and the antitoxic bodies are not forthcoming, we must assist Nature to make good the deficiency. Antitetanic serum, if one may be allowed the use of an analogy, acts towards tetanus toxin as an alkali acts on an acid—by neutralization.

On theoretical grounds, therefore, so many units of antitetanic serum injected into a tetanic patient will neutralize a given number of *free* toxin units. This sounds very simple; why, then, is the serum as a curative agent not infallible? In veterinary practice there are several reasons; the writer will allude to only one here, to the others later.

As we have seen, the toxin has a great affinity for nerve-cell elements; therefore, given a reasonable chance, the union between a molecule of toxin and a cell molecule is presumably a fixed one, and we know of no agent capable of breaking down this union—not even serum. For the serum to carry any therapeutical value, it must reach the channels where free toxin is to be found at the earliest possible moment. It has already been said that the union of toxin and cellular molecules is presumably fixed; nevertheless, one is justified in thinking that there are various degrees of fixity, and in those instances where the union is a loose one an excess of antitoxic serum may exercise a detrimental effect on such toxin. For this, and for other reasons which will be seen later, very full doses of serum must be given at the outset.

Further, important therapeutical results will follow from the local application of antitetanic serum to the wound, and its injection into the adjacent soft structures; by facilitating phagocytosis in creating a positive chemotaxis.

Mode of Administering Antitetanic Serum in Dosage.—In the whole range of serum therapy there is none which demands a more reasoned and methodical consideration in the mode of administration than antitetanic serum.

To inject so many units under the skin, and expect good results therefrom, is nothing short of sheer folly and professional laxity, and this has done more to discredit antitetanic serum than anything else, the reason being not far to seek. It has been conclusively proved that serum injected *subcutaneously* takes from twenty-four to thirty-six hours to become absorbed, which means, of course, that so many valuable hours are lost. As already pointed out, the toxin has a predilection for nerve cells, and as the antitoxin does not readily pass from the circulatory to the nervous system, where the real storage of toxin with its pathological manifestations has taken place, it is obvious that the administration of the serum through the circulatory or lymphatic channels can only carry with it a therapeutical value in the neutralization of free toxin floating in the blood. The intravenous injection of serum, therefore, charges the blood rapidly, and certainly carries more value with it than by the subcutaneous route.

Although serum does not readily pass from the circulatory to the nervous system, it passes with great ease from the nervous to the circulatory; obviously, therefore, the clinician should endeavour to charge the nervous system with serum from the outset by the following channels: intracranial, intraspinal, intraneural, and to a lesser degree intramuscular.

Intracranial.—This is largely impracticable in our animals, although frequently adopted in man. It is no easy matter successfully to trephine a horse's skull with the patient standing, when one remembers the hypersensitive condition of an animal with tetanus, whilst casting materially aggravates the symptoms.

The Intraspinal or, more accurately speaking, intradural channel of injection has given the writer, so far, better results, but cases have been too few to dogmatize upon.

Intraneural.—This carries considerable limitation. The situation of the wound has to be considered; the nerve to be injected must be superficial, and it must be sufficiently large to admit of the insertion of a needle and the absorption of a fair amount of serum. From 3 to 5 grains of cocaine is injected over the nerve in the vicinity of and above the wound. The nerve is then exposed, a fine needle plunged into its long axis, and the serum slowly forced in.

The Intramuscular is the easiest of all the methods, but unfortunately it has least therapeutical value, inasmuch as the larger proportion of serum is taken up by the circulatory and lymphatic system, as against the nervous system. The needle is plunged into the soft structures around the wound at various points and, needless to add, under strict sterile precautions. For this purpose the writer uses 2 parts serum and 1 part tincture of iodine—the latter helps to neutralize the toxin, stimulates effusion, increases cellular activity, and consequently localized phagocytosis—all of which tend to retard the absorption of toxin. The operation may be repeated daily, but if the swelling is considerable the iodine should be discontinued.

Dosage.—Five hundred units of serum is the dose invariably recommended by the subcutaneous or intravascular channels; this, however, is totally inadequate. Never less than 5,000 units every twelve hours should be given for the first three days. By the intradural channel 500 units every twenty-four hours for the first five days. By the intraneural method a quarter to half those doses may be given, depending upon the size of the nerve itself.

General Treatment.—The patient should be placed, if possible, in a darkened and isolated box, the floor being bedded with sawdust, moss litter, sand, or short bedding. For those animals which take kindly to slings, slinging from the outset is of first importance, and a full dose of aloes with a hypodermic injection of eserine administered. All sedatives which tend to clog up the eliminative organs, such as opium and its derivatives, must be left severely alone. An electuary placed on the tongue and suppositories composed of chloral hydrate and camphor administered *per rectum* are useful in combating the spasms, and they leave no ill-effects. The system should be charged with free iodine by the intratracheal injection of Lugol's solution. The dose of physic, by unloading the bowels, lowers blood-pressure, stimulates the lacteals, and facilitates the elimination of toxin from the body fluids. The iodine has a direct influence on the free toxin, and is a cellular and lymphatic stimulant. Quietness is, of course, essential; if the patient is excitable, *lightly* plugging the ears with cotton-wool deadens extraneous sounds. Where one is called in before complete trismus has taken place, every effort should be made to retard this process. There is nothing better for this than letting the patient have a whole mangel or swede to masticate at intervals. The act of prehending these roots stretches the jaw to the maximum. In addition, nutrient slops should be allowed *ad lib.* Where the jaws are completely locked, it is very useful to pass a flexible vulcanite tube along the roof of the mouth to the fauces, and inject liquid nutrients with the syringe. At first the patient resents this treatment, but soon shows evident enjoyment. Nutrient enemas are also indicated here. Where a wound is detected, it must be deeply curetted and all foreign material removed. As the bacillus is anaerobic the laying open of punctured wounds is essential, and for the same reason all firmly adherent scabs must be removed. In some cases it is good practice to dissect out a large portion of the wound area, then pack with tampons soaked in antitetanic serum alternated with tincture of iodine, these dressings being repeated at intervals. If the case follows a hopeful course recovery takes place in four to six weeks.

TETANY.

Very occasionally tonic spasm of the muscular elements of the body is noted, simulating true tetanus. This is probably due to reflex irritation acting through the sympathetic system. It usually responds to treatment in two or three days. This consists of a full dose of purgative medicine, followed by chloral hydrate and camphor. The affected muscles should be fomented, after which a stimulating anodyne liniment is well massaged into the parts.

THOROUGHPIN.

The excessive accumulation of synovia distending the synovial sheath lining the tarsal arch, and covering the flexor pedis perforans tendon, constitutes the condition known as thoroughpin. Lameness may be present, or the disease may only exist as an eyesore. In the former condition rest is imperative by keeping the animal indoors, placing it on low diet, and giving a full dose of physic, also applying hot fomentation and white lotion to the part. If the lameness is great, a high-heeled shoe should be ordered. When the acute stage has been reduced, or in those cases where lameness is absent, various methods of reduction can be tried; thus, absorption by pressure, for example, by applying a blister, using the actual cautery, or covering the distended area outside and inside by hydrargyrum emplastrum, over which layers of tow are placed, and finally over all, equalized pressure by a special thoroughpin spring truss. In using this instrument, however, care must be taken to see that it is properly adjusted, so that its edges do not cut into the tissues. Some authorities recommend aspirating the synovia and injecting into the sheath absorbent solutions—*i.e.*, ½ per cent. solution of perchloride of mercury and 1 per cent. solution of tincture of iodine—and the animal given a long rest.

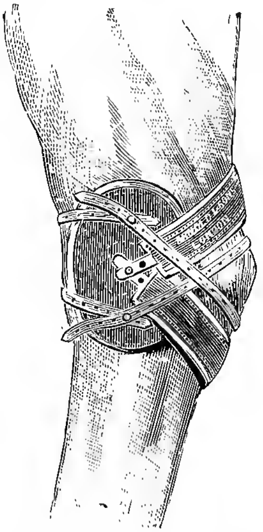

Fig. 184.—Thoroughpin Truss.

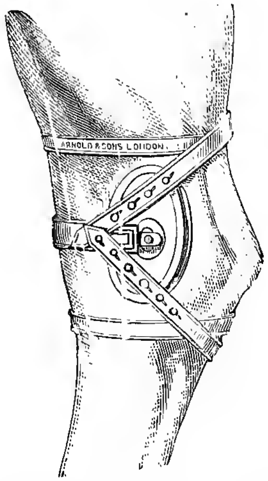

Fig. 185.—Thoroughpin Truss.

THRUSH.

A degenerative process of the horny frog, accompanied by a fœtid discharge, the condition is largely due to accumulated dirt, wet, and general neglect. All loose horn having been pared away, a spatula covered by tow is passed through the frog cleft to dry up excess of secretion. The cavity is then packed with a drying powder composed of 1 part each of calomel, iodoform, and boric acid. This dressing should be applied daily, and instructions given to keep the feet as dry as possible. Occasionally one sees in practice all four feet affected, almost pointing to a constitutional idiosyncrasy. In these cases a dose of physic, followed by a course of diuretics and tonics, are suggested.

TICKS.

Of all the problems confronting the scientist employed upon disease repression in warm countries, that of the mitigation or eradication of the tick pest has probably been of the greatest importance from the economic point of view as well as of the saving of animal life.

Africa, America, and Australia have each had their tick problem, and though far-reaching results have been effected towards its eradication, the tick is still a menace and a grave State concern to the Governments of all the continents harassed by its ravages.

Apart from the economic results involved (depletion of blood, anæmia, loss of condition, value of hides, etc.), the toll of animal life has been immeasurable, and the main incidence of this insect attack has fallen upon the bovine through the agency of certain species of the ticks in transmitting disease-producing germs. In such way the piroplasmoses of the ox, redwater or Texas fever, and East Coast fever, have caused incalculable loss. The horse and dog, however, have not escaped lightly from the ravages of such tick-borne diseases as are peculiar to their species.

Man himself is happily immune to specific disorders from tick attack, with the exception of certain diseases like relapsing fever, or the Rock Mountain fever, but he is liable to experience much discomfort and persistent skin irritation if he incurs exposure to attack from the abundant forms of tick life, chiefly larval, which exists on badly infested lands, especially where long grasses afford cover to tick life.

Although not confined to the African continent, it may be said that Africa experiences a much heavier incidence of tick-borne diseases than any other continent, in which latter the pathogenic tick is concerned mainly in the propagation of the blood parasite (*Babesia bigemina*) responsible for the cattle disease known as redwater or Texas fever. South Africa, however, in addition to this disease, is affected by tick diseases specific to all domestic animals. In this way the ox suffers from the disease of (*a*) East Coast fever, conveyed by at least three species of tick—the red tick (*Rhipicephalus evertsi*), the brown tick (*Rhipicephalus appendiculatus*), and the black-pitted tick (*Rhipicephalus simus*)—all of which act as vectors for the parasite *Theileria parva*, which produces the disease in question; (*b*) redwater, conveyed by the blue tick (*Boophilus decoloratus*); (*c*) gall sickness, conveyed by the bont tick (*Amblyomma hebræum*); (*d*) spirochætes, by the blue tick (*ut sup.*), etc., and this enumeration of diseases does not exhaust the pathogenic possibilities of the South African tick so far as the bovine is concerned.

In the horse is induced the disease biliary fever, caused by the parasite *Nuttallia equi*, introduced by the red tick.

In the sheep and goat paralysis, heartwater, and other diseases are tick-borne; while the dog suffers a dangerous disease (biliary fever) from infection of the organism—*Piroplasma canis*—due to the bite of the dog tick, the *Hæmaphysalis leachi*.

While even this formidable list is incomplete, enough has been said to show that the problem of eradication is a serious one for those countries where tick life is abundant.

Medicinal treatment is of small avail in many of the diseases enumerated. Redwater of cattle, however, is amenable to treatment with aniline dyes such as trypan blue (150 c.c. of 1 per cent. solution injected in the early stages giving good results), as is biliary fever in the dog; but up to date no specific remedy for most of the graver forms of tick disease has been found, and the remedy lies essentially in the direction of prophylaxis—*i.e.*, tick destruction. The task of destroying the myriad forms of tick life in a badly infested country was long looked upon as a hopeless endeavour. Pitchford of Natal, however, who made a study from 1905 to 1909 of the problem as it affected Natal (where tick life was exuberant), was able to show the ease with which farms could be ridded of their ticks by the regular immersion at short intervals of all live stock upon the farm in an arsenical emulsion in such a way as to kill the parasite and leave the host uninjured.

This possibility he made use of in checking the fatal tick-borne disease, East Coast fever, by adapting dipping measures with nicety to the life phases of the pathogenic tick, and in such a way made possible the control of the disease which Koch had prophesied would sweep away the cattle of the subcontinent from coast to coast. Where the exact conditions laid down by this worker have been observed, the disease has been eradicated; but where from motives of policy, economy, or an attempt at following "the line of least resistance," alterations and readjustments of the system of eradication have been attempted, the disease has consequently recrudesced.

Dipping is the only rational and final policy of tick repression, and where the farmer has recognized this, not only has tick-borne disease been eradicated, but the condition of stock has been markedly improved, while thousands of acres of the most valuable pasture previously too dangerous to run stock on have been brought into profitable use.—*H. Watkins Pitchford.*

TONSILLITIS.

The tonsils, being very rudimentary in the horse, scarcely call for special consideration here, for it is extremely doubtful if inflammation of these organs ever exists as a separate condition; and when they do become involved the more important condition of pharyngitis overshadows them.

The dog and cat are, however, subjects of tonsillitis sometimes as an independent condition, but more often complicated with pharyngitis. The patient's bowels should be unloaded by a purgative—for the dog, 1 to 3 grains of calomel; and for the cat, 1 to 2 grains of hydrargyrum cum creta. If there is a temperature, aspirin is a most useful agent—3 to 5 grains for the dog, 1 to 3 grains for the cat. Locally the tonsils are swabbed night and morning with peroxide of hydrogen (1 in 10) or painted with carbolic acid (strength 1 to 20), to which has been added a little glycerine. In some cases the tonsillitis tends to become chronic; for such cases a course of tonics should be prescribed, of which there is none better than **small** doses of Easton's syrup.

TRACHEA, DISEASES OF.

Disease special to the trachea is very rare indeed, if one excludes new growths, malignant and non-malignant. Extensions are seen in practice taking place from the larynx and the bronchi, these being usually of an inflammatory nature—tracheitis. The treatment, therefore, of tracheitis must be directed along the lines advocated for laryngitis and bronchitis.

Stenosis.—Diminution in the tracheal capacity may be the result of fracture consequent upon external injury, or more often due to the presence of tumour formations.

Where the rings are extensively fractured, and symptoms of dyspnœa, consequent upon internal and external œdema, take place, tracheotomy must be immediately performed at a point lower than the seat of injury. Antiphlogistic treatment is then locally applied, and when a return to the normal is reached the tracheotomy tube can be dispensed with. In the case of new growths, where breathing is dangerously interfered with, tracheotomy must here also be performed at a point below the seat of obstruction. If the subject is an ox, fattening for the butcher is the most economical course. In the horse two courses are open—*i.e.*, insert a permanent tracheotomy tube, or remove the neoplasm surgically.

If the growth can be located and it is circumscribed, the patient is cast, a local anæsthetic injected, and the skin shaved and sterilized over the seat of the disease. The skin and underlying tissues are then incised, exposing the trachea, the edges being kept well apart by retractors. Several rings of the trachea, depending upon the extent of the disease, are then cut and kept apart also by retractors. The exact nature and extent of the growth are noted, and by means of the knife and curette careful removal is effected. If this is successful the skin wound is closed, dressed, and treated in the usual manner. If, however, the operator finds the growth is too extensive for successful surgery, it is inadvisable to proceed further, in which case the wound should be closed and the future usefulness of the animal secured by the use of a tracheotomy tube.

TRACHEOTOMY.

Although this is a simple operation and can be successfully performed by the fewest surgical appliances, ingenious instruments and elaborate technique have from time to time been devised. A sharp-pointed lancet, two retractors, and a pair of small hook forceps are really all that is necessary.

The animal is twitched, a local anæsthetic is injected, the hair is clipped, and the skin sterilized at the seat of operation. Some authorities advise operating at a point situated in the upper third of the trachea, others advise lower down, but where the case is not one of tracheal obstruction and the whole trachea forms an optional area, it is a matter for individual discretion.

It should be pointed out, however, that the higher site of operation has much to commend it. If new growths form, and they sometimes do, at the seat of operation, tracheotomy can then be performed lower down. Further, in the case of a hunter hunting in a " water country," if he is " tubed " low down and gets into water, he is more liable to be drowned than he would be with the tube near the larynx. Probably, the best seat of operation is at the point where the trachea seems to be only covered by skin, and as this varies slightly in animals the distance from the larynx will vary also. The head is elevated, thereby making the skin and subcutaneous muscular tissue tense, and an incision about 3 inches long made over the mesial line of the trachea. Some authorities are then content to make a *perpendicular* incision through several rings, others remove parts of the rings, so that a *square* " window " is formed, while others prefer an *oval* opening.

Considering that the tracheotomy tube to be inserted is usually more or less circular, it has always appeared to the writer to be much more consistent with common surgical technique to make a circular opening in the trachea. The skin and subcutaneous tissue having been drawn apart by retractors, the trachea is clearly exposed, and a lancet is thrust in between two rings and moved in a circular fashion, cutting through two or three rings according to the size of the opening required. When the circle has been nearly completed, the loose portion of the circular ring is secured by hook forceps and the remaining attached part cut. The object for this precaution, of course, is obvious, for if the ring was completely detached by the inrush of air it would be dragged into the trachea. The trachea opened, slight hæmorrhage will follow, and the blood being drawn into the lungs, the animal will have a coughing fit; this, however, is of small moment, and will soon pass off.

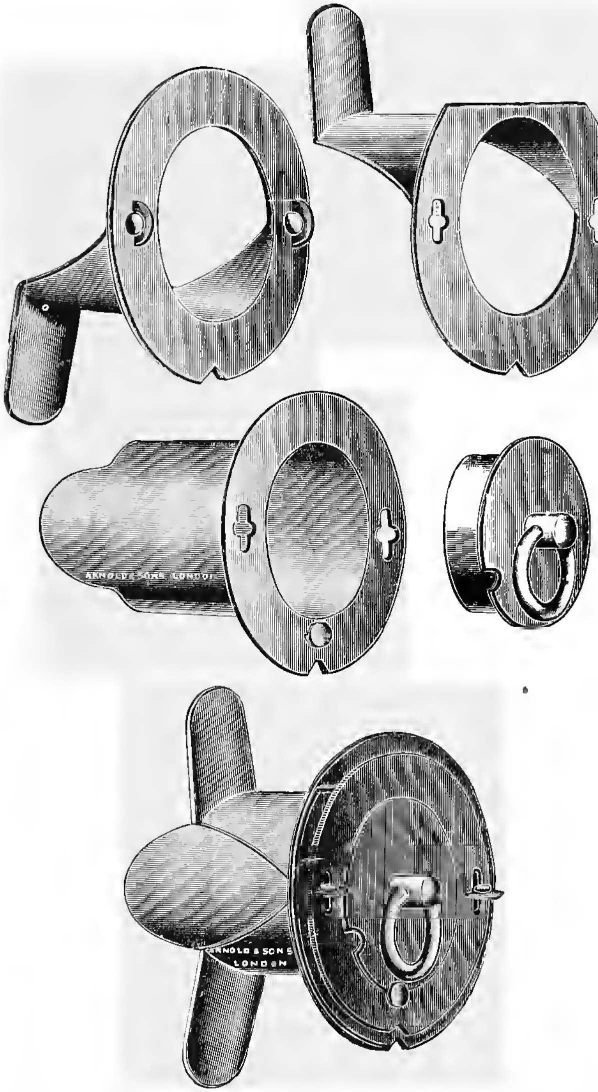

FIG. 186.—TRACHEOTOMY TUBE, SELF-RETAINING. (Jones.)

If the operation is an emergency one and intended for the insertion of a temporary tube, the writer prefers the ordinary pewter type kept in position by tapes fixed over the neck. If the case is one where a permanent and self-fixing tube is required, it is well to retain the temporary one for a few days until post-operative effects pass off, when it can be replaced by a permanent tube. Of these there are many excellent examples to be obtained. After operation the tracheotomy tube should be removed once or twice daily, and all coagulated blood, serum, and debris, carefully removed by soaking in hot water and Lysol before replacing. When the edges of the wound become hard and "grasp" the instrument the discharge will cease, requiring only an occasional removal of the tube for cleaning purposes. Tracheotomy is performed in all obstructive con-

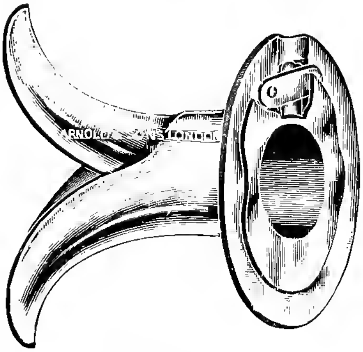

Fig. 187.—Tracheotomy Tube, Self-retaining. (Field.)

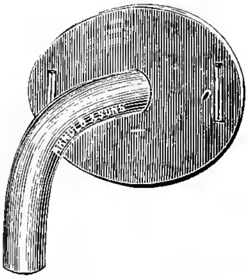

Fig. 188.—Tracheotomy Tube—Pewter.

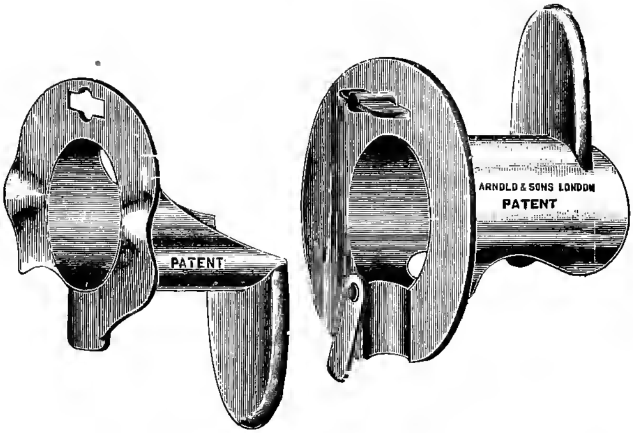

Fig. 189.—Tracheotomy Tube, Self-retaining. (Coleman.)

ditions in the nose, pharynx, larynx, and upper portion of trachea from the presence of foreign bodies, neoplasms, abscesses, and prior to stripping the ventricles for bad cases of roaring. The operation is not in much demand in bovine surgery, but in those cases of post-pharyngeal malignant growths, or glands which cannot be reduced, tracheotomy should be performed with a view to preparing the animal for the butcher.

It is also occasionally performed in the cow with the object of reducing straining in cases of prolapse of the uterus and such-like. This operation in the hands of the writer has not conferred much benefit, however.

Sequelæ.—The after-effects of tracheotomy are as a rule negligible. In unhealthy subjects, however, traumatic pneumonia may follow, and if the case is one of purpura hæmorrhagica with throat œdema, the operation wound may take on an unhealthy aspect. As a rule the greatest trouble is to be found in full-blooded horses, particularly where the tube is not a perfect fit, by the development of excessive granulations on the cut cartilages and mucosæ. Where these become excessive (chondroma), obstructing the easy replacement of the tube, they must be removed surgically. Where their recurrence is persistent, it is much better to allow the wound to close and perform another operation lower down. In old horses, occasionally bone formations take place in addition. Here also their removal surgically is demanded.

TREADS (CORONET).

Treads of the coronet are often very troublesome to cure. These are largely due to the distance from the centre of the circulation and consequent slow healing powers of the parts, the position lending itself to easy contamination by dirt, and lastly the neglected condition the practitioner often finds the wound in when asked to treat the case. The wound must be cleansed with hot water, to which is added a little Lysol, after removing the surrounding hair.

If the coronary band is much inflamed, antiseptic foot baths, a dose of physic, and low diet are indicated. If granulations form, these must be removed by cauterizing with nitrate of silver or chloride of zinc sticks. After a time the part should be smeared daily with Stockholm tar. If there is lameness, a blister round the coronet and a run at grass is indicated. Should bulging of the horny wall under the injured coronet take place, the judicious use of the knife and rasp is called for.

TREPHINING.

Trepanning the sinuses of the head is called for in the accumulation of pus, in the removal of neoplasms, in disease of the turbinated bones, and in "punching" out molars. Very occasionally the cranial bones are trephined in fracture.

The operation is a comparatively simple one. The animal is cast and chloroformed. The site of operation having been chosen, the skin is shaved, dressed with iodine, and a crucial incision made extending to the bone. Each triangular flap is then picked up and cut, the result being a circular ring. Any loose subcutaneous tissue is then removed, exposing the bone. The diameter of the cutaneous ring should be slightly larger than that of the trephine—usually $\frac{3}{4}$ inch. With a bone screw—an ordinary gimlet will answer the purpose—a small hole is bored in the bone at the centre. This hole is intended to contain the adjusting needle of the trephine, its object being to prevent the instrument from "floating" on the surface of the bone until a deep enough groove has been made to retain the saw. The bone having been cut through, the disc usually falls into the cavity, in which case a bone elevator may be used, or it may be picked up with a pair of forceps.

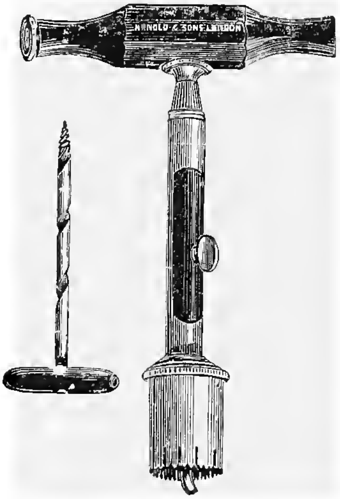

Fig. 190.—Trephine with Gimlet. (Mannington.)

Sometimes it is retained in the circular saw, and has to be probed out. In the sawing process the grooves of the instrument become "caked" with powdered bone, which interferes with the cutting edges. This accumulation should be removed when necessary by scraping with a hard-pointed instrument, or a stiff brush may be used. In old horses, the bone being hard, a fair amount of physical force is required, while in young animals much less is needed.

Frontal Sinus.—The situation chosen for trephining this sinus is usually at a point equidistant between the inner canthus of the eye and the mesial line of the frontal region.

Where both sinuses require opening at one trephining, a point at the mesial line, of course, should be chosen. In cattle the sinus is trephined at two points—*i.e.*, higher and lower. The higher operation is at a point almost equidistant between—a little nearer the horn base than the mesial line—the lower edge of the horn base and the mesial frontal line. The lower operation is performed at a point about an inch from the inner margin of the supra-orbital foramen and an inch above an imaginary transverse line uniting the upper margin of the orbits.

If pus is present, an outflow will take place as soon as the bone is pierced. The operation wound must be made as dependent as possible by twisting the head upon the neck and the cavity irrigated, but not before the animal has recovered from the anæsthetic. If pus concretions are present, these must be removed by means of a spoon or special scoop, in which case it is often necessary to enlarge the trepanned wound. If the discharge persists, a drainage opening should be made by passing a strong curette through the trepanned opening in a downward and slightly inward direction, piercing the floor of the sinus, so that the discharge passes through the nose; and irrigation thus being carried out daily, a cure is usually effected. Where neoplasms exist, these must be removed by the knife and curette, and the cavity flushed daily with a mild antiseptic.

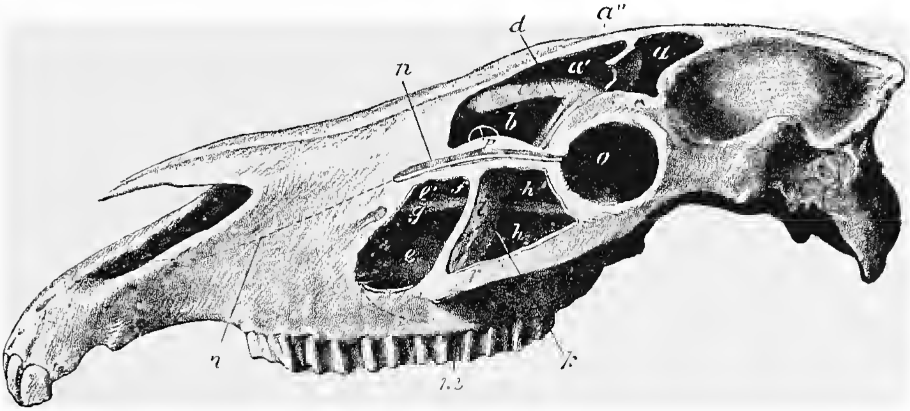

Fig. 191.—Lateral View of Horse's Skull: the Facial Sinuses exposed.

a, Posterior portion of frontal sinus; *a'*, anterior portion of same; *a''*, the septum dividing them; *b*, posterior portion of the anterior turbinated bone; *c*, cavity of nostril; *d*, ethmoid bone; *e*, superior maxillary sinus (lower part), which is divided from the upper part *h*, *h*, by the thin septum *i*; *e'*, bony plate forming the lateral boundary of the posterior turbinated bone *f*; *g*, infra-orbital canal; *k*, line dividing the upper (thin) from the lower (thick) portion of the septum; *m*, lower margin of the maxillary sinus; *n*, nasal duct; *o*, orbit; *p*, zygomatic ridge.

(From Dollar's "Regional Surgery.")

Superior Maxillary Sinus.—The site of operation here is about an inch above the zygomatic ridge.

In the majority of young animals this sinus is divided into two compartments—a superior and inferior—but in the case of many old horses it disappears, or partially so. When it exists it is sound surgery to break it down, for, as a rule, if one portion of the sinus is involved, the other is affected also. By this means only can free irrigation be carried out.

Trepanning of this sinus is performed in cases of pus accumulation, for the removal of tumours, and for the " punching " of molars. In the latter case the seat of trepanning must, of course, be in such a position that the chisel can come into direct line with the *root* of the diseased tooth.

Nasal Sinuses.—The turbinated bones become diseased through severe attacks of strangles, glanders, chronic nasal catarrh, nasal gleet, mucoid degeneration, or neoplasms—usually malignant. In some conditions the mucous membrane may undergo such degenerative changes as to leave the bone almost denuded. Where the case is one of long standing, heroic measures are imperative. If the disease is bilateral, it is safest to operate on one nostril at a time, leaving the other until the effects of the first operation have passed off.

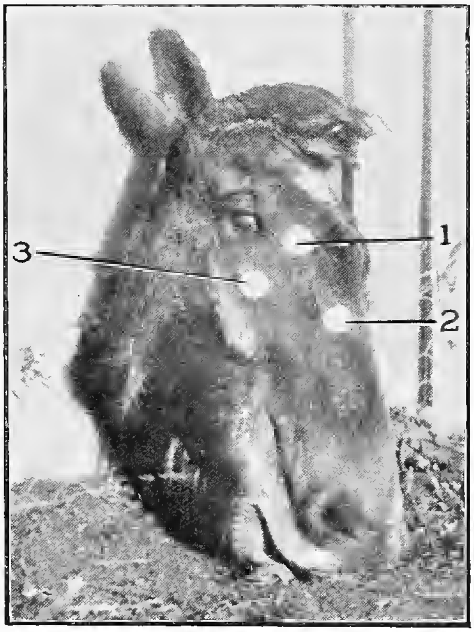

Fig. 192.—Showing the Regions for Trephining.
1, Frontal sinus; 2, nasal sinus; 3, superior maxillary sinus.

For the trephining operation the animal should be chloroformed, but where removal of the turbinated bones is called for, hæmorrhage being great, a return to partial consciousness is a necessary condition, to prevent blood from being inhaled into the trachea. For a similar reason the poll should be raised by a sand or straw bag, and the nose directed downwards. The nasal bone is trephined in two places 1 to 2 inches apart, and in a line with the long axis of the head. The skin between these two openings is then incised, the edges drawn apart, and the surface of the bone cleared of all soft structures. This section of bone is now removed by means of the saw, with the result that a fairly large opening is made and a good view of the turbinated bone obtained. The next step consists in removal of the diseased turbinated bone, and should the case be one of long standing, nothing short of complete removal, as a rule, will effect a cure. The removal is effected by means of the knife and curette. When as much as possible is removed through the trephined opening, the writer inserts a fairly large and long curette up the nostril, and by this means removes all detached and semi-detached pieces of bone. The hæmorrhage, as a rule, is pretty severe. If it is excessive the nasal cavity should be packed with tampons of sterile gauze or pledgets of tow soaked in adrenalin, each tampon or pledget being first secured by a piece of cord which hangs out of the trephined opening, the object being, of course, to effect the removal of the packing when this is called for—usually in about forty-eight hours after the operation. If the hæmorrhage is slight, swabbing the cavity with adrenalin solution often succeeds in checking the bleeding. Some years ago the writer operated on a ten thousand guinea stallion with bilateral necrosis of the turbinated bones. One nostril was cleared out, the poll was raised, and the nasal cavity irrigated through the trephined opening by a cold water hose-pipe for fifteen to twenty minutes. The cavity was then swabbed with adrenalin, and a similar operation performed on the opposite nostril. The patient made a complete recovery, and is still at the stud.

Post-Operative Treatment.—Whether a sinus or the nasal cavity has been operated upon, after-treatment is of first importance; in fact, it must be said at once that the operation may be completely and skilfully performed, and yet ultimate recovery may be thwarted by post-operative maltreatment or neglect.

The patient must be placed in healthy surroundings, and the cavity irrigated once or twice daily with a recognized antiseptic. The antiseptic chosen must be weak and non-irritating, those agents which coagulate albumen, such as perchloride of mercury, being contra-indicated. A selection is: Proflavine, 1 : 3,000; permanganate of potash, 1 : 1,000; boric acid, 1 : 750; peroxide of hydrogen, 1 : 6. Any and all of these are preferably diluted with normal saline solution, 1 dram to the pint. The best means of irrigating the cavities is by a human enema syringe, attached to which is a metal tube about 12 inches long with lateral perforations at the end, so that the solution may spray the whole cavity wall. If the discharge persists, insufflations of iodoform are often beneficial. Where a single trepanned opening has been made, there is a tendency for it to close before the discharge has ceased; to overcome this, the wound should be plugged with a cork the proper size, so that it fits securely.

In all old-standing cases the patient is usually debilitated; therefore, good food and a course of tonics are advised.

℞ Arsenici Albus	grs. v.
Ferri Sulphatis Nucis Vomicæ	āā ʒii.
Sodii Chloridi	℥i.

M. Ft. pulv. One to be given night and morning in manger food.

TRYPANOSOMIASIS.

It is only in comparatively recent years that we have recognized the existence of a wide class of diseases having as its main feature the presence within the blood system of the affected animal of an elongated protozoal organism with a flagellum, exhibiting a lively undulating or lashing movement when viewed during life upon the stage of the microscope. The well-defined genus Trypanosoma is now recognized as having a very wide distribution, being present in the blood of fishes and reptiles, as well as in that of the higher vertebrates.

The trypanosome is generally to be found in the circulation or in the juice of glands or spleen of infected animals, and while it sometimes appears to exist in a chronic state adapted to the tissues of its host and exerting no definite pathogenic effects upon the same, it is at other times associated with an acute clinical course which rapidly terminates the life of its warm-blooded host.

The essential agency of a blood-sucking fly is shown to exist in the transmission of some cases of trypanosomiasis, but this evidence is lacking in other instances, though such agency can be reasonably inferred. In certain trypanosomal diseases—such as dourine for example—no intermediary agent, fly, etc., seems to be necessary to the completion of the life cycle, nor can such agency be supposed to obtain in the trypanosomal infections of fishes or reptiles.

Speaking generally, however, it may be said that trypanosomiasis is a fly-borne disease, and undergoes in some diseases, at least, a definite metamorphosis in the body of the fly before being retransmitted to a warm-blooded host.

Although trypanosomiasis exacts a considerable toll of animal life in the aggregate, it is not characterized by outbreaks of a spreading or devastating nature such as attend some bacterial diseases. Where the fly transmitting the disease, whether tabanus, stomoxys, glossina, or other blood-sucking fly, is known to exist, and, in addition, cases of the disease such as can provide an infective centre are also present, the possibilities of an outbreak over a restricted area are existent, but occurrences are as a rule sporadic, and can be guarded against through recognition and anticipation of the cause.

Prevention is even simpler in the case of the equine trypanosome disease dourine, for castration, segregation, or the prevention of sexual contact will prevent the transfer of the trypanosome, which latter is dependent entirely upon infection incurred during sexual congress.

Classification of all the known forms of trypanosomiasis would take much space and be foreign to the purpose of the present work. The four chief trypanosome diseases of the lower animals upon which the veterinarian is liable to be consulted are dourine, mal de Caderas, surra, and n'gana, the latter having already been dealt with under that heading (*q.v.*).

The first of these, dourine, has also been stated to be a malady transferred essentially during the act of coitus, and not dependent upon the agency of any known form of intermediary bearer. The trypanosome so transferred is the *T. equiperdum*, and this organism exists primarily in the mucous secretions of the genital passages of both sexes. In the female it has been shown to persist for over a year in the vaginal mucus. It may also be demonstrated in the blood and in the peculiar skin tumefactions—the so-called "plagues"—which attend the more advanced phases of the malady. The disease runs a more or less chronic course if the animal is permitted to live. Glanders and œdematous swellings, progressive emaciation, ulceration of the genitals, and anæmia, are among the chief objective symptoms, while involvement of the nervous system is shown by signs of paraplegia, want of co-ordination, etc.

Treatment is rarely attempted, as risk of transmission persists so long as an infected animal remains in the locality. Risk may be reduced by castration of the stallion, when affected, or by the exercise of especial care to avoid the possibility of his becoming infected during travelling or when serving unknown mares.

The disease is met with in Europe, India, Egypt, Asia Minor, and to a lesser degree in the United States and Canada. In the latter country some excellent investigation work has recently been concluded, showing, amongst other things, the effective restraint upon the disease course exerted by antimony. Intensive treatment of atoxyl and white arsenic on alternate days has also given useful results.

The second trypanosome disease mentioned above, mal de Caderas, is a South American malady affecting horses and dogs. It is due to the presence of the trypanosome *T. equinum*, an organism which appears to have its habitat in the circulation of the capybara, a large rodent which acts as a natural reservoir to the organism (in a parallel manner to the big game host of n'gana or the camel host of the disease surra). Mal de Caderas is an extremely fatal disorder, though its clinical course is lengthy. The symptoms are those common to the trypanosome group of diseases—progressive anæmia, œdematous swellings, weakness of the loins, nervous derangement, corneal involvement, and a general state of cachexia not amenable in the present state of our knowledge to any specific form of treatment.

Surra is another trypanosome disorder of frequent occurrence and wide Asiatic distribution. Most of our investigations have been made in India, where the disease is very prevalent. All domestic animals, including the camel, appear susceptible, and the disease appears capable of being spread by various biting flies, and even fleas have been shown able to act as the vector of the specific organism *T. evansi.*

The syndrome or group of specific symptoms conforms to that of the trypanosome infections generally, as mentioned above, and the lines of treatment usually adopted are those essayed with varying and qualified success in the other trypanosomiases. Arsenic and antimony in their varying combinations hold out the best prospects of successful treatment. Ehrlich's preparation of "Trypanroth" was at one time hoped to possess specific properties of a remedial nature, but this drug was found to fail in treatment of the horse, and we have yet to discover an efficient and specfiic agent which will rid the system of the host of its trypanosome when once this latter has established its hold.

Enquiries are now in progress providing for the employment of the serum of the infected animal itself, after an intensive arsenical treatment has served to abolish the trypanosome from the general circulation. This result, however, is insufficient to eradicate the disease, and the latest work is designed to reintroduce the animal's own medicated serum into the subarachnoid space, where, it is held, the parasite is entrenched and beyond the reach of a medication affecting only the general system. It is too early yet to speak of the likelihood of such a method being usefully applied to the treatment of the lower animals, but hopeful results are claimed for the system as applied to the human being harbouring the sleeping-sickness trypanosome, the *T. gambiense.*—*H. Watkins Pitchford.*

TSETSE FLIES.

These insects of the genus glossina are said to have received the name "tsetse" from the noise of the wings during flight. The bite of the tsetse has long been recognized as being dangerous to animals, but it is only of late years that the disease, sleeping sickness of man, has been shown to be due to a similar cause.

The best known and most widely distributed species of the genus is the *Glossina morsitans*, the fly responsible for the spread of the disease n'gana (*q.v.*), which it effects by inoculating the animal with the germs of the *Trypanosoma brucei*. Since Bruce showed in Zululand in 1896 the connection between the fly and the disease, several species of tsetse flies have been discovered, and many forms of trypanosomiasis shown to exist in warm-blooded animals, both wild and domesticated. It is now recognized, contrary to the first impression, that a definite part of the developmental life cycle of some trypanosomes is lived in the body of the fly, showing the latter to be essential to the continuance of the specific disease, and not merely functioning in the rôle of its vector or mechanical transmitter.

In the occurrence of the disease trypanosomiasis we further recognize not only the essential nature of the tsetse fly, but also the necessity for the existence of a reservoir to which the fly must have access before, by the ingesting of the disease germ, it becomes itself infective. Such reservoir exists in the system of the infected animal, which, either in an acute and rapidly fatal phase or in a chronic and tolerant state, infects the fly in the act of feeding, which in its turn reintroduces the germ into the system of the next warm-blooded host after the completion in the system of the tsetse fly of certain developmental stages.

Settlers and natives in Africa, where the true tsetse or *Glossina morsitans* exists, noticed that the danger of infection becomes much greater whenever a locality is visited by big game, and this led Bruce to demonstrate the fact that such wild animals harbour, and act as reservoirs for, the infective trypanosome without themselves suffering to any apparent extent from the malady. In their migration these wild animals are followed closely by the tsetse fly, and in such manner wooded localities or danger zones—the so-called "fly belts"—are produced, destruction of which belts or zones (by felling its timber) is followed by the disappearance of the disease, and great controversy is evoked as to the adoption of these varying systems of extermination.

Transport riders, travellers, etc., traverse recognized belts during the hours of darkness, for the danger zone rarely extends over a greater distance than can be covered in three or four hours' travel. To the permanent settler, however, the problem is one of great seriousness, as it frequently leads to the abandonment by the pioneer of his clearings and farms, and to the occurrence of heavy loss amongst his live stock.—*H. Watkins Pitchford.*

TUBERCULIN.

Introduced by Koch with the view of curing human tuberculosis, it has proved itself to be a valuable diagnostic agent in the hands of skilled veterinarians. Tuberculin injected into the body of an animal suffering from tuberculosis causes a reactive phase which, if scientifically interpreted, is very reliable. A reputable brand of tuberculin is essential, probably the one most relied upon being produced by the Pasteur Institute, Paris.

Various methods of applying the test are adopted in practice.

Subcutaneous Method.—The usual seat of inoculation is over or in front of the scapula. The syringe used should be sterile, the hair clipped, and the skin painted with tincture of iodine, but when a large number of animals are being tested this latter precaution is often neglected. The dose varies according to the size, age, and species of the animal. Thus the dose for the adult bull is 3 to 4 c.c., the cow and the horse 2 to 3 c.c., and for young and small animals in proportion. The temperature should be taken at least once prior to injection, but when practicable two registrations are better. After injection, the temperature is registered on the ninth, twelfth, fifteenth, and eighteenth hours, while under special circumstances it may be necessary to take it on the twenty-fourth hour also. If the highest temperature registered is 2·7° F. above the pre-injection average temperature, the case must be considered as one of tuberculosis. If there is a 2° F. rise, it should be looked upon with suspicion, and retested in a month with a slightly larger dose. These points are mentioned, not dogmatically, but as a general guide, so that the practitioner must, in arriving at his conclusions, not fail to take collateral evidence into consideration. Thus a cow showing enlarged lymphatic glands, emitting a hacking cough, that is or has been a heavy milker, and is hide-bound, may give no reaction at all, while probably she is in the advanced stages of tuberculosis. On the other hand, young animals may register high and erratic temperatures and be non-tubercular. In like manner, cows during œstrum may give abnormal thermic reactions suggestive of tuberculosis, and yet be free from that disease.

Again, some thermic reactions are very erratic and cannot be altogether relied upon. Thus, if the temperature rises rapidly within the first twelve hours and as rapidly falls, and although the registration made indicates a rise of 2·5° F. or even a little more above pre-injection temperature, the case, while it may be looked upon with suspicion, should be retested later on; also an up-and-down temperature is not to be relied upon. Or, again, where an animal's temperature before injection is 103° F. or slightly over—and it is often so in the case of young bulls and calves—a 2° F. rise may safely be regarded as indicative of tuberculosis, while 1·5° F. rise should be looked upon with suspicion and retested later.

As a general rule, in testing animals they should be kept in as natural a condition as possible; thus they should not be over-excited, or given cold water to drink before taking the temperature, and the housing accommodation where possible should be free from draughts, while on the other hand the atmosphere should not be overheated. Animals that have been surreptitiously injected with tuberculin by unscrupulous owners will fail to react when tested by the expert. To prevent this risk, of course, tuberculin should only be sold to experts. This is a *sine qua non.*

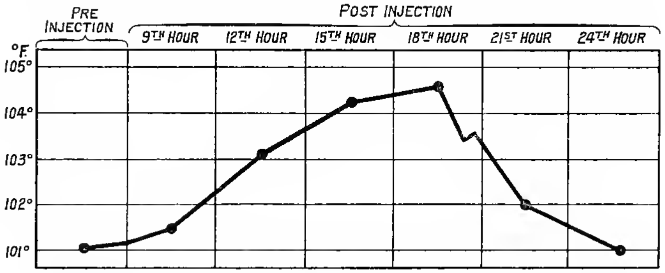

Fig. 193.—Typical Tuberculin Thermic Reaction.

Ophthalmic Method.—A few drops of specially prepared concentrated tuberculin is inserted between the lower lid and the eyeball by means of an eye dropper, or a 1 c.c. syringe minus the needle may be used.* If the reaction is a positive one, conjunctivitis will be set up within six to ten hours, manifesting itself by redness of the membrane, mucoid discharge from the inner canthus, and a general weakened appearance of the eye. The opposite eye, being clear, is observed as a control. A few hours later a mucopurulent discharge will show itself, the pus consisting of polymorphonuclear leucocytes. This mass, appearing first like a large drop of candle-grease descending from the inner canthus, becomes hard and crusted, and eventually drops off. This test is usefully applied in those cases which have been treated with the subcutaneous test and are looked upon with suspicion. Some practitioners apply the subcutaneous and ophthalmic test simultaneously, but it is a much better policy to apply the subcutaneous first, and if necessary later on use the ophthalmic.

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* Ophthalmic discs, specially prepared and inserted between the lower eyelid and the eye, can also be obtained now, and form a very handy means of testing.

Intradermal Method.—This consists in injecting with a very fine sterile needle 2 or 3 minims of tuberculin into the *deeper layers of the skin*, not subcutaneously. The usual seat of inoculation is between the base of the tail and the anus. The tail is elevated, making the skin tense, and scrubbed with a mild antiseptic and dried. A fold of skin is then picked up and the needle passed into the *cutis* in a slanting direction and the antigen injected. If the reaction is a positive one, in about twenty-four hours at the seat of inoculation a swelling will often occur about the size of a walnut.

Cutaneous Method.—The hair is clipped and the skin shaved over an area 1 to 2 inches in diameter in the scapular region. With a very sharp sterile lancet this area is scarified perpendicularly and then horizontally until slight bleeding occurs. Concentrated tuberculin is then painted over the abraded surface. If the reaction is positive, an œdematous swelling will appear in about twenty-four hours, and may last two, three, or four days.

The advantages of the ophthalmic, intradermal, and cutaneous over the subcutaneous method are:

1. A smaller quantity of tuberculin is used, and where a large number of animals are to be tested this may be of some economic import.
2. In animals showing a pathological temperature the subcutaneous method is ruled out, at least temporarily, while the other methods may be proceeded with forthwith.
3. Applying the subcutaneous test bars its reapplication for a month or more, and where a definite diagnosis is immediately called for the other methods are justified.
4. In applying the subcutaneous test in a large number of animals, a great deal of time and labour is involved in registering the temperatures. The other methods are, therefore, time and labour savers.

Finally, it must be pointed out, however, that in general routine practice the subcutaneous method is recognized on the whole as the most reliable, and the one usually adopted.

TUBERCULOSIS.

The treatment of tuberculosis in animals, so far as the veterinary profession is concerned, is a barren field, and yet in many instances it is one of the most curable diseases we have to deal with. The animals which are affected at some period or periods of their lives are legion, and yet they appear to enjoy perfect health. The truth is that Nature, aided or unaided, in this disease perhaps more than in any other, shows herself to be a wonderfully skilled physician, working incessantly in her fight against the ravages of the tubercle bacillus. The calf is born free from tubercle bacilli, but it has inherited a low degree of immunity in many cases against the organism; consequently, as the result of ingesting tubercular milk or inhaling a germ-laden atmosphere, the bacteria find suitable soil in the system for their growth. The lymphatics become in time charged with them. They may here run riot, auto-intoxication sets in, followed by cachexia and death; or the intestinal mucosæ may be the seat of their ravages—tabes mesenterica—leading to profuse diarrhœa and dissolution; or the parenchyma of the lungs may be diffusely affected, secondary bacteria gaining a foothold, setting up a vicious circle ending also in death. On the other hand, Nature may gain the mastery, the bacterial foci become encapsuled, the metabolic processes obtain, and what is almost of as much importance maintain, a normal standard, with the result that the animal reaches adult life with a healthy index. From what has been said, our course of action is obviously prophylactic and curative. Equine and canine tuberculosis, being so rare, need not be considered here, but, on the other hand, bovine and porcine is all-important.

Prophylaxis.—If a young calf or pig, let them be ever so susceptible to the action of T.B., are removed from all sources of specific infection, they will remain free from tuberculosis; and as the writer opines that the most dangerous period of infection is during the developmental stage of the animal, no stone should be left unturned to achieve this end, difficult as the process may be. A mother which is tubercular (open or closed), even if the mammary gland itself is free, should not be allowed to bring up a calf, and although the open form of the disease is infinitely more dangerous than the closed type, nevertheless the closed may merge insidiously into the open at any time, with disastrous results to the offspring. Obviously, then, to free a herd of tuberculosis the tuberculin test must be called into requisition, and all reactors separated from the healthy. Further, the reactors, when expense is not of first consideration, should be destroyed. This completed, thorough disinfection of all housing should be vigorously carried out. To maintain a tubercle-free herd, it is imperative that each animal should be retested periodically, and, further, no fresh animal should be introduced until it has passed the test. The Tuberculosis Order of 1914, now in abeyance, would have gone a long way towards freeing our herds from this serious scourge. Nevertheless, if owners of herds looked upon the ravages of this disease in the light of an economic proposition, it would pay them in the end to have their animals tested at their own expense, particularly so in the case of valuable animals. It is a well-recognized fact that a cow which is the host of tubercle bacilli may emit the organism by the exhaled air, by the expectoration (cows seldom expectorate, but occasionally discharges from the lungs are coughed out of the mouth), by the milk stream, and lastly by the fæces.

In a series of experiments carried out by Stenhouse-Williams, Scott and Roberts, it was proved that out of a large number of cattle in apparent good health, 2 per cent. were passing out of the system with the fæces virulent tubercle bacilli. This means these animals were contaminating pasture-land and manures, and thereby acting as an insidious source of infection. It is probable this latter means of infection is not as universally recognized as it should be.

As a *general prophylactic* measure all animal surroundings should be healthy, with plenty of cubic breathing space and sunlight, while overcrowding should be prevented. The diet should be sufficiently rich and digestible, and compatible with maintaining a good healthy body standard.

In the case of milch cows, where the owner is obsessed with the desire of breaking milk records, he gorges his animals with artificial stimulating foods, and incidentally predisposes them to tuberculosis. This procedure cannot be too severely condemned. Finally, every endeavour should be made to breed from healthy strains only.

Curative.—In the strict acceptation of facts tuberculosis in animals is seldom consciously treated by veterinary surgeons, and yet the writer asserts there is no practitioner of bovine medicine who has not knowingly or unknowingly treated this disease on a more or less extensive scale. So long as bovine tuberculosis remains latent, there are no clinical data, speaking generally, which suggest that the animal is in the slightest degree removed from the normal healthy standard; hence it is that surprise is often expressed at the findings of the tuberculin test. In like manner an owner sells a fat cow or ox which probably he has bred, and asserts it never had a day's illness, and yet the butcher demands a return of his cheque owing to the carcass being condemned from advanced tuberculosis. These experiences are not occasional, but daily occurrences, and there must be some reason for it.

When T.B. invade the system and the first line of defence is broken down, active phagocytosis takes place, and if the defensive system is primed to a high degree in due course the infective foci become cast off or encapsuled. These latter centres may be distributed throughout the lymphatic system and the parenchyma of the viscera, and that too, perhaps, on an extensive scale. How, then, does such extensive organic disease fail to bring about in many cases metabolic disintegration? The only answer can be that

Nature is successful in her efforts of encapsuling the infective centres and so preventing *auto-intoxication*. Further, that in her curative efforts she has not interfered with the functioning of the organs of nutrition. Of course, it must always be understood that these reparative processes can only take place under favourable circumstances—namely, where an animal is kept under hygienic conditions and fed upon food of a high nutritive value. *Per contra*, malnutrition, exposure to adverse climatic conditions, or insanitary surroundings, ever a productive source of disease in general, are particularly fruitful in favouring the progressive march of tuberculosis, and must be avoided. It must always be remembered, too, that although Nature may succeed in circumventing tuberculosis, the defensive barriers are liable to give way under adverse circumstances. Cases of this kind are well known to all practical men. For example, a cow may have old-standing tubercular centres in the lungs and adjacent lymphatic glands, and yet appear to be in good health and condition. She calves down, probably out of doors in wet weather with a cold east wind blowing, or she may have had a difficult parturition, or the placenta may be retained and septic metritis set up, or she may be driven to a distant market and put on rail over-heated and over-excited too soon after calving, all these tending to lower the vital forces; the tubercular centres break down, auto-intoxication sets in, followed by secondary infection, pneumonia, and death. Treatment here is both preventive and curative. The adverse circumstances should be removed when possible, and the depression and debility counteracted by tonics, stimulants, nutrients, and good food, and last, but not least, by the exercise of common sense. As regards the complications following parturition, these should be energetically treated as they arise.

When the disease localizes itself in a gland or glands of the throat, complete removal is called for. The animal is cast, chloroformed, the skin cut through, and by the use of the knife combined with digital manipulation the diseased gland is enucleated. As the seat of operation usually involves the important bloodvessels and nerves of the neck, the operator must possess sound anatomical knowledge of the parts. In some instances liquid matter may be present, and the capsule wall which contains it is often much distended and thinned. In cases such as these great care must be exercised in the process of dissection to prevent the escape of infective material. Should this occur after removal, the whole surface of the cavity is lightly rubbed with common salt, thereby stimulating the flow of blood and serum, which flushes the wound. After waiting some little time it is then painted with tincture of iodine and a single suture inserted in the skin. By so doing free drainage is allowed.

Subsequent treatment consists of irrigating the cavity daily with a saline solution of proflavine. In those cases of open pulmonary tuberculosis where treatment is decided upon, secondary bacteria are much in evidence, and the line of treatment which has given the writer best results is as follows: The bronchial secretion is collected, either by drawing out the animal's tongue, keeping the mouth open, making it cough, and holding a sterile plate in front of the mouth to catch the expectoration, or by means of lung puncture and aspirating the *materiès*. From this material a vaccine is made. The organisms present are usually micrococci, streptococci, and sometimes *B. coli*. To the vaccine tuberculin is added. In a full-grown animal graduated doses are given weekly, commencing with 1 c.c. and even going up to 10 c.c. Medicinally an adult cow should have the following:

℞	Hydrargyri Iodidi Rubri..	grs. viii.
	Creosoti Pulveris Nucis Vomicæ	āā ʒi.
	Ferri Sulphatis	ʒii.
	Anisi Fructus	℥i.

M. Ft. pulv. One night and morning in flax gruel and 6 ounces of cod oil.*

When the bowels are the special seat of the disease—most commonly seen in young animals—and treatment is decided upon, a course of creosote, cod-liver oil, and malt extract may be tried, along with the injection of regulated doses of tuberculin. As a rule, however, treatment in these cases is not a sound proposition.

TUMOURS.

Neoplasms are either simple or malignant. They may be situated superficially, in the tissues under the skin, or in the viscera. Further, they may be single or multiple. If superficially situated, their removal is effected by caustic dressings, the actual cautery, or by ligature, but as a rule extirpation by the knife is the most surgical and satisfactory method. A benign tumour, it must be remembered, as the result of continual friction and advancing years, often merges into a malignant one, the best example of which is probably a simple wart merging into a malignant carcinoma. Obviously, then, a simple neoplasm should not be allowed to remain, owing to the danger of malignant development. Further, all tumours tend to grow, and the larger they are the bigger the operation. It is therefore sound surgery to remove all neoplasms when possible in the initial stage.

In simple tumours complete removal is as a rule an easy matter, and the risk of recurrence is negligible; not so, however, when they are malignant, and it is this tendency of recurrence that the successful surgeon must ever have in his mind to ward against and do his utmost to thwart. Thus, in removing these he must not only be content to dissect out the neoplasm itself, but go further afield and remove some of the healthy surrounding tissue as well. Further, adjacent lymphatics which are found to be enlarged must be enucleated also. Again, in dealing with such specific neoplasms as actinomycotic, botryomycotic, and tubercular growths, which in themselves contain infective material, the surgeon must ever be careful not to permit of the escape of the specific content, which is liable to contaminate the surgical wound, tending to bring about a recurrence. Should this misfortune occur, the writer advises rubbing the whole surface of the wound with common salt, which will increase the flow of blood and serum, after which it is then painted with tincture of iodine or iodized petrol, and for preference left unsutured. If, however, the wound is a very large one, it may be packed with gauze soaked in iodine and one or two sutures inserted. This is removed in two or three days, and then treated as an ordinary wound. If a neoplasm is very large, considerable hæmorrhage is to be expected and provided for. The writer in these cases carefully dissects all round the base of the growth, picking up important bloodvessels as they are encountered, and when it is partly enucleated twists the tumour on its own axis. After making several twists in one direction it is rotated in the other direction, thereby breaking down its connection with adjacent tissue. It will now be found to be hanging by the bloodvessels which have fed it, and it can then either be removed by further twisting by using the ecraseur, or by ligature. When the neoplasm is situated near vital bloodvessels and nerves, particularly when it can be enucleated after dissecting with the knife up to a point, digital surgery should be practised and the knife only used where necessary.

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* Cod oil is much cheaper than cod-liver oil.

In practice one sometimes comes across cases where, to completely remove a tumour, vital structures require sacrificing, and should these be essential to the animal's welfare the surgeon encounters his limitation. In cases such as these the owner should be acquainted with the hopeless nature of the condition. On the contrary, where an operation is demanded, as much of the growth as compatible with safety should be removed with the knife and the remainder carefully curetted.

New growths occurring in the vital internal organs can be successfully removed, particularly in the smaller animals, but they are as a rule malignant. From an economical point of view they should not be lightly undertaken, for, unlike the human surgeon, we must produce more or less permanent results before the operation can be justified.

After the removal of malignant neoplasms all irritation of the wound should be reduced to a minimum. It should therefore be kept undisturbed as much as possible, the sutures removed early, and all dressings of a coal tar nature eschewed.

TURBINATED BONES, DISEASES OF.

Following upon a severe attack of influenza, strangles, or even nasal catarrh, the mucous membrane covering the turbinated bone and the nasal septum undergoes organic changes. These are most commonly of the nature of mucoid degeneration or ulceration, resulting in a persistent nasal gleet. If the case is seen early the bi-daily irrigation of a mild antiseptic such as proflavine 1 : 2,000 or permanganate of potash 1 : 1,000 in normal saline solution, followed by the insufflation of iodoform, is advised. Steaming the nostrils with steam medicated with carbolic acid, creasote, terebene, or eucalyptus is also beneficial. The animal being usually in a debilitated condition, good food with treacle and cod-liver oil is essential, and, further, it may be placed upon a course of arsenic and iron.

When the mucosa has been stripped off the bone, necrosis will in all probability have set in, indicated by a characteristic nasal smell, in which case medical treatment is of no avail, the subject being one for surgical interference (see Trephining).

ULCERATION (STOMACH).

This condition is occasionally seen in the dog; when diagnosed all food should be withheld, so that the stomach may be placed in a state of rest for some days, nourishment in the meantime being carried out by means of nutrient enemas. Medicinally the following is indicated:

℞	Ferri Sulphatis	grs. ix.
	Magnesii Sulphatis	grs. x.
	Acidi Sulphurici Dil.	♏v.
	Aquæ	ad ℥ss.

M. Ft. haust. One tablespoonful to be given three times a day.

If there is much vomiting, this must be checked by the administration of a hypodermic injection of morphia or the following prescribed:

℞	Morphia	gr. $\frac{1}{30}$
	Acidi Hydrocyani Dil.	♏ii.
	Bismuthi Subnitras	grs. v.
	Sodii Bicarbonatis	grs. x.
	Aquæ	q.s. ad ʒi.

M. Ft. haust. One teaspoonful every five hours until relieved.

If these fail to bring about relief, 5-grain doses of ingluvin three times a day are worthy of a trial. A counter-irritant applied to the epigastrium is also beneficial. For this purpose a mustard plaster or "Musterole" may be used. As the animal is usually thirsty, iced water should be given at intervals.

The danger, of course, in all cases of ulceration in the stomach is perforation. If this should take place and it is diagnosed early the abdomen should be opened, the ulcer located and excised, or "buried" by through-and-through sutures of catgut, or Lembert's silk sutures may be used. When the peritoneum is extensively involved chances of recovery are remote. The peritoneum in these cases should be swabbed out with sterile normal saline solution to which has been added 1: 4,000 proflavine, and the abdominal parietal wound closed, allowance being made for drainage if necessary.

ULCERS.

These occur in various situations of the body. They may be divided into benign and malignant, good examples of the latter being seen in glanders, on the septum nasi, farcy buds, epizoötic lymphangitis, tuberculosis, actinomycosis, etc.

The treatment of simple ulcer consists of cleansing from all dirt and debris by hot saline fomentation, followed by light curetting and the application of sulphate of zinc solution 1: 40, or it may be lightly touched with pure carbolic acid and then dressed daily with zinc lotion. Where the ulcer is a specific one, complete removal with the knife is indicated, after which, if the disease is situated in a region of the body where the skin is loose, the edges should be brought together by sutures and treated as an ordinary wound.

In those positions where the skin is tense scab formations must be removed often, so that the edges of the wound will grow inward, thereby reducing the risk of a blemish.

In practice one meets with various kinds of ulcers, each often demanding special treatment. The following are a few of the most common:

The **Callous Ulcer** is one in which the edges have been allowed to become inverted and indurated, and where the base has become covered with unhealthy granulations. Treatment here consists of removing the edges by means of the curette or the knife and deeply scarifying the base of the ulcer, so that a pronounced depression follows, which in process of shrinking draws the edges of the skin inwards.

The **Constitutional Ulcer** is seen in those cases of debility accompanied by old-standing anæmia. The animal should be placed on a rich diet combined with tonics, the best of which is the following :

For horse and ox :

℞	Arsenici Albus	grs. v.
	Ferri Sulphatis	ʒii.
	Sodii Chloridi	℥ii.

M. Ft. pulv. One to be given night and morning in food.

For Dog :

℞	Liquoris Arsenicalis	♏v.
	Syrupus Ferri Iodidi	♏xx.
	Aquæ	q.s. ad ʒi.

M. Ft. haust. One teaspoonful three times a day after food.

Locally, the ulcer should be dressed with a solution of sulphate of zinc daily.

The **Inflamed Ulcer** is seen in those cases where dirt has set up sepsis, which in some cases is so severe that septic cellulitis and general poisoning may ensue. Cases of this kind should not be neglected.

The animal should have a purgative, hot fomentations with salt applied to the part, the curette should be freely used, the ulcer touched with carbolic acid or nitrate of silver, and where practicable Bier's treatment applied.

In those chronic ulcers which appear to defy the usual treatment the writer has obtained good results by applying a smart biniodide of mercury blister over the diseased area and the internal administration of iodide of calcium, the dose for the horse being 1 to 2 drams, and for the dog 3 to 5 grains. This drug the writer looks upon as invaluable in these cases.

UMBILICAL CORD, DISEASES OF.

Inflammation.—Umbilical phlebitis is liable to occur in any young animal through the cord becoming contaminated immediately or soon after birth with infective material. As a matter of fact, however, if one excludes the foal and the calf, in practice it is seldom seen in other animals in this country. It would be gathered, then, that dirty, unhealthy surroundings in which the newly-born find themselves are a strong predisposing factor, and although this is true up to a point, we must look deeper into the subject to gauge its proper significance. For example, if dirty surroundings alone were the root cause, scarcely a new-born animal would be free from the disease, for how many foaling boxes, calving and lambing pens, or kennels, are clean as we professional men understand cleanliness, and yet ophthalmo-phlebitis cannot be called a universal disease. The truth is that the umbilical cord of practically every newly-born animal becomes contaminated, unless we exclude those that have been surgically dressed; but given a high inherited power of resistance, coupled with a perfectly normal and healthy umbilical cord, the animal possesses all the attributes necessary to ward off disease as a rule. On the contrary, if the resistance against disease is low and the cord is large, flabby, and maybe œdematous, then septic inflammation is almost sure to follow, often ending in death by septicæmia or leading up a train of symptoms grouped under the term of joint evil.

Treatment of this condition is both prophylactic and curative.

Prophylactic.—Every care should be exercised to see that the animal is delivered under sanitary conditions. If the practitioner is present at birth, he will ligature the cord with sterile silk or catgut close to the abdomen, and paint the whole stump with tincture of iodine, repeating the dressing daily for seven to ten days. Some practitioners use perchloride of mercury dissolved in hydrochloric acid and methylated spirit for the same purpose. When the cord is large and flabby the writer injects into the mouths of the open vessels an antisera—streptococcal, staphylococcal, and *B. coli.* This sera in suspicious cases should also be injected subcutaneously. By adopting these measures, not only is umbilical phlebitis prevented, but also the more far-reaching one—*i.e.*, pyæmic arthritis, or joint evil.

Curative.—If phlebitis is established, the clot contained within the vessels will very soon undergo disintegration by the action of pus-producing organisms. These tend to be taken up by the lymph and blood stream, ending in suppurative polyarthritis. As a rule, when this stage is reached an economic cure is indeed rare. If the patient is seen when the disease is confined to the cord itself, the writer places the greatest reliance upon the antisera mentioned under prophylaxis. The patient is placed on its back and held by assistants. The stump of the cord is removed close to the abdomen, all clot and pus removed, and 10 to 20 c.c. of the compound polyvalent antisera injected into the lumen of the vessels by a serum syringe, or the cord may be left fairly long, the serum injected, and the stump ligatured. A quittor, husk, or hypodermic syringe, will answer the same purpose.

The animal should be kept on its back for some time to allow of the dispersal of the serum. The stump is then sealed with collodium, and the injection repeated daily for several days.

In the case of valuable animals it is also advisable to charge the blood with antibodies by injecting the antisera above quoted (see also Joint Evil).

Hæmorrhage.—As the result of breaking off the cord too close to the abdomen excessive bleeding has been observed, and it is possible that, in those animals predisposed to hæmophilia, excessive bleeding may follow rupture of the cord at birth. If Nature is left to her own resources, however, the cord being torn, the elastic arterial coats rapidly recoil, and all danger of hæmorrhage is as a rule passed. When an animal is bleeding to excess, all that is required is the application of a ligature. This, of course, should be composed of sterile material, but as a matter of fact the layman, who usually sees to this, uses an ordinary piece of twine, and if the cord is perfectly healthy no harm will follow.

Œdema.—Occasionally one sees in practice a thick, flabby cord from which, when squeezed, serum oozes out. Such a cord is an unhealthy one, and in advanced cases the offspring, if it lives, is as a rule unhealthy, too. In many of these cases, however, the animal is dead born, prematurely born, or dies soon after birth. In those that live serum injections are advised, combined with painting the cord with tincture of iodine alternated with perchloride of iron daily until shrinkage takes place.

UMBILICAL HERNIA. *See* Hernia.

URACHUS (PERVIOUS).

The flow of urine from the umbilicus as well as from the normal channel is, as a rule, a matter of small import. When the normal exit is occluded, however, such an obstruction is often beyond the realm of practical surgery, the patient's life being curtailed thereby.

In simple and uncomplicated perforate urachus, and this is what one usually finds in practice, treatment is equally simple and effectual.

After inserting a pencil of lunar caustic once or twice along the urachus and withdrawing it, the writer orders to be applied daily to the cord and surrounding skin a little biniodide of mercury ointment 1 : 12. This treatment, carried out for a few days, is usually effectual in sealing up the lumen of the vessel.

URÆMIA.

In veterinary medicine this condition is seldom seen, or perhaps it may be more accurate to say seldom diagnosed. It must be looked upon in the light of a terminal condition, and, as such, prognosis must ever be grave. If the patient is seen in the convulsive stage it ought to be destroyed, for all that one can hope for here is slight prolongation of life. The almost complete lack of kidney functioning impels the practitioner to stimulate the compensatory organs, which in this case are the skin and the bowels. A purgative should be given at the outset, great reliance being placed on calomel. For the horse, aloin and calomel; ox, calomel and sulphate of soda; for the dog hydrargyrum cum creta. The skin is stimulated with sweet spirits of nitre, acetate of ammonia, salicylate of soda, citrate of soda, combined with clothing the body, and in the case of the horse bandaging the limbs. The most valuable treatment of all, however, consists of "washing" the blood with a large quantity of normal saline solution, either subcutaneous or intravenous, and preceded by bleeding. By the latter means the overcharged system is relieved of a quantity of circulating toxic material, combined with a reduction of the abnormal blood-pressure always present in these cases. If the convulsive stage is reached and treatment is decided upon, one's sheet-anchor is full doses of bromide of sodium.

The writer has seen four cases showing uræmic symptoms where, owing to the presence of obstructive urethral calculi, rupture of the bladder has taken place. Treatment in such cases, of course, is out of the question.

The diet should be light, laxative, and digestible, while an abundance of liquids is indicated, the most valuable of which is barley water.

URETHRITIS.

Compared with man, this condition is very seldom seen in the lower animals. A localized inflammation is noted, however, due to the presence of rough-surfaced calculi. Treatment consists of their surgical removal (see Calculi).

Occasionally the condition is set up by the careless passing of the catheter, or by using a septic catheter. This is especially seen in the dog. The urethra should be irrigated with proflavine 1 : 3,000, permanganate of potash 1: 4,000, protargol 1: 8,000, and the flow of urine stimulated by giving sweet spirits of nitre, acetate of ammonia, or potassium nitrate. Internally urinary antiseptics are indicated, a useful prescription for the dog being:

℞	Hexamini	grs. v.
	Acidi Borici	grs. vi.
	Sodii Benzoas	grs. vii.
	Infusi Buchu	ad ℥ss.

M. Ft. haust. One tablespoonful night and morning.

URINE.

Strictly speaking, the examination of urine is not a therapeutic conception; nevertheless, a correct understanding of the nature of pathological urine is the stepping-stone to scientific and successful therapy, and the practitioner who fails to interpret the signs of urine removed from the normal in the course of the case under his care is considerably handicapped compared with the painstaking attendant who investigates this valuable diagnostic product.

Specific Gravity.—This is determined by the urinometer, an instrument composed of a glass bulb filled with mercury and a stem about 3 inches long along which the mercurial column rises. This column is graduated, so that when placed in plain water it rises to a given mark registered at 1,000. The normal specific gravity of a horse's urine, the specimen being taken from a twenty-four hours' collection, averages usually about 1·030; cow, 1·020; sheep, 1·010; dog, 1·025. Generally speaking, the specific gravity varies inversely with the amount of urine passed. A high specific gravity usually indicates an excess of urea, or chloride of sodium, or the presence of sugar; while a low specific gravity suggests a diminished kidney activity.

Colour.—A highly diluted urine, as would be expected, is pale in colour. An acid urine is usually more highly coloured than an alkaline urine of the same density. A pale urine is often associated with poorness of blood, while a dark urine suggests fever. A high-coloured urine is often due to the presence of urobilin, and is seen in very acute febrile conditions such as purpura, influenza, toxic pneumonia, etc. Red urine indicates the presence of hæmoglobin, as in redwater. Black urine is seen in hæmoglobinuria, severe forms of jaundice, blackwater. Yellow or brown urine is a common condition in jaundice. A milky-coloured urine is present in chyluria, or an excess of phosphates, or even the presence of pus (pyuria).

Reaction.—This is demonstrated simply by means of litmus paper. Normal urine is usually slightly acid. Hyperacidity is seen in diabetes mellitus, rheumatism, chronic nephritis, leukæmia, etc. Hyperalkalinity suggests diabetes insipidus, polyuria, anæmia, œdema, etc.

Miroscopical.—Sedimentary deposits in urine may be divided into organized and unorganized.

Organized Deposits.—Mucus gives to urine a cloudy appearance, which sinks on standing, the addition of acetic acid making it more pronounced. Casts are cylinder-shaped structures with rounded ends, their origin being the kidneys. There are several varieties seen in practice: (1) Epithelial casts are derived from the epithelial cells of the kidney; (2) granular casts are composed of albumen or fat, and indicate an advanced degeneration; (3) hyaline casts are homogeneous, transparent bodies, their presence being more easily detected by the addition of a small quantity of potassium iodide solution; (4) blood-casts are the result of acute inflammatory conditions, and are composed of red and white corpuscles held together by a fibrous matrix; (5) bacterial casts are found in extensive invasion of the urinary tract, the organisms appearing in clumps, or they may be present as single units.

Unorganized.—(1) Uric acid appears as large, various-coloured crystals in dumb-bell, prism, rosette shapes. These are dissolved in sodium hydroxide. (2) Calcium oxalate are colourless, highly refractile, envelope-shaped crystals soluble in hydrochloric acid and insoluble in acetic acid. (3) Ammonium crystals are irregular triangular prisms. Urine possessing these crystals gives off an ammoniacal odour. (4) Phosphates are wedge-shaped crystals, and are soluble in weak acetic acid solution.

Tests—*Albumen.*—1. In testing for albumen, if the urine is not perfectly clear it should be made so by means of filter paper.

A test tube is then quarter filled with urine and heat applied until it boils. If the fluid becomes turbid, noticeable when held up to a good light, it is due either to albumen or earthy phosphates, to determine which, a few drops of nitric or acetic acid are slowly added. If albumen is present, the turbidity remains; if phosphate salts, it disappears. It should be pointed out, however, that when albumen is present a few drops of nitric acid added may cause partial disappearance of the turbidity, but if more acid is added the full amount of albumen will be thrown down. It is, therefore, a wise policy to go on adding the acid until ten to fifteen drops have been added.

2. Another method consists of placing a small quantity of clear colourless nitric acid in a small test tube. Partly fill a pipette with filtered urine and insert the pointed end against the wall of the tube containing the acid, allowing the urine to flow down the side slowly. The urine will then overlie the acid, and if albumen is present there will appear at the point of contact a sharply defined white band. This is known as Heller's ring test.

3. A third test consists of filling a test tube half full of clear urine, adding 5 c.c. of a 5 per cent. solution of ferrocyanide of potassium, and thoroughly mixing, after which slowly add 1 c.c. of acetic acid. If albumen is present a flocculent precipitate will form.

There are several other tests for albumen, but for all practical purposes these suffice in general practice.

Sugar (*Trommer's Test*).—Take 4 or 5 c.c. of the suspected urine and add 1 c.c. liquor potassii. Then add drop by drop a 10 per cent. solution of oxide of copper. On the first drop or two reaching the urine a blue precipitate of hydrated copper protoxide forms, which, if sugar is present, is redissolved on shaking the mixture. This is suggestive of the presence of sugar. The addition of the copper solution is continued until a slight excess has been added and the precipitate is no longer dissolved. The mixture is then boiled for a few seconds, and if sugar is present yellow cuprous hydroxide precipitates. This precipitate loses its water and becomes red cuprous oxide, which falls to the bottom or sides of the test tube.

Fehling's Test.—Take sulphate of copper, 90½ grains; neutral tartarate of potassium, 364 grains; solution of caustic soda, 4 ounces; distilled water, 6 ounces. Mix these together. Place 1 dram of this solution in a test tube and boil, and add 1 dram of the urine to be tested, shake, and boil. If sugar is present, the yellow suboxide of copper is precipitated.

Note.—The solution for this test must be freshly prepared.

Fermentation Test.—This is a most valuable one. Place a small piece of yeast in a test tube which has been previously filled with the urine to be tested, and invert it over a vessel also containing the urine. If sugar is present fermentation occurs, carbon dioxide forms, the gas driving the urine out of the test tube.

UTERINE TORSION. *See* Dystocia.

UTERUS, PROLAPSE OF.

Prolapsus uteri may follow immediately after expulsion of the fœtus, or it may be deferred some little time after parturition. If the womb contracts normally after delivery, even with a fair degree of straining afterwards, eversion would be most difficult. In the writer's opinion the condition is due to a flaccid condition of the womb and ligamentous attachments, and failure of normal contraction. If these conditions are present coupled with straining on the part of the mother, eversion is an easy matter.

The condition is most commonly seen in the cow, and very occasionally in the mare, sow, and ewe. Of all these animals the mare makes the worst subject, for she invariably throws herself down as if suffering from acute colic, and by so doing is liable to seriously damage the organ. Every effort in this patient should therefore be directed towards preventing this danger by keeping her walking about until assistance is obtained.

Before attempting to reduce the everted organ in the mare a word of warning to the inexperienced may not be out of place. A mare in this condition often develops an irritable disposition, and the operator in the interests of his own safety must ward against being kicked. It is advisable to give *per os* or *per rectum* a full dose of chloral hydrate and a full hypodermic injection of morphia at the commencement.

The patient is placed in such a position that the fore legs are much lower than the hind. The eyes having been blinded, a twitch applied, and the fore leg picked up, a careful examination of the uterus is made for wounds. The whole organ is carefully washed in a mild antiseptic. This is best carried out by placing the womb in a bucket filled with the solution and held by an assistant, while lavage of the organ is carried out by the surgeon. In the cow, retained pieces of placenta, often present, should be removed. If there is a wound it should be sutured with sterile gut. The organ, thoroughly cleansed, is now placed in a bucket filled with ice-cold water and an antiseptic, the object being to produce a degree of contraction. This completed, a boiled sheet is brought up between the buttocks and the uterus and held by an assistant at each end. The bucket is then removed and the organ is received in the sheeting, which is now so placed that it completely covers the womb. The operator by digital pressure through the sheeting forces the serous effusion and blood out of the viscera, thereby diminishing its capacity. This completed, the organ is now ready to be returned, and for this purpose it is uncovered, but the sheeting is still held by two assistants in such a position as to keep the long axis of the uterus in a plane with that of the body, or a trifle higher. Digital manipulation is now directed to a point at the upper aspect of the womb nearest the superior commissure of the vulva. Before proceeding with this, however, here also a note of warning to the inexperienced may be necessary. It must be remembered that the uterus is a more or less friable organ, the wall of which can only tolerate a given degree of pressure; go beyond that, and rupture of its coats will surely follow, culminating in serious and often fatal results. The operator must therefore err on the side of caution. Further, the points of the fingers should not be directed towards the wall owing to the risk of piercing. Finally, forcing efforts should not take place during the act of straining, the correct moment to attempt replacement being between each heave of the patient. If straining is considerable, more chloral and morphia should be administered, while a long bar of wood or a crowbar laid over the loins crosswise and held by an assistant at each end keeps the back from being arched and tends to thwart straining. Having forced the upper portion of the uterus into the vaginal canal, the lower aspect is treated in a similar manner, and after the canal has become nearly filled with the organ the closed fist is laid against the distal end of the uterus and the organ steadily forced through the vagina. This stage reached, the difficulty is overcome. The next point is to direct the hand inwards as far as it will reach, so that the womb becomes completely spread out, as in the normal condition.

To facilitate this, the writer always makes it a point of parting the lips of the vulva and part of the vaginal canal by the two hands. By this means the visceral vacuum is obliterated by the inrush of air, which "balloons" the womb and overcomes convolutions and eversions in the body and horns of the uterus. The next step is to carry in several handfuls of carbolized oil to smear the uterine wall, while to facilitate contraction the hand is moved freely over the organ for several minutes. One or more pessaries may now be inserted and the lips of the vulva secured by a vulval clamp or by the insertion of three sutures. These should be left *in situ* for two, four, or six days. The secret of success in all these cases of eversion depends mainly upon the operator, who must be possessed of a large degree of manipulative dexterity, coolness, and patience.

After-treatment consists of giving an aperient followed by alterative doses of salines for some days, and laxative foods. If a thermic rise takes place, moderate doses of tincture of aconite and salicylic acid are advised. In those cases where the womb is badly lacerated or where mortification has set in, replacement is contra-indicated and surgical removal of the organ is called for (see Amputation).

When the animal is down and unable to rise, or will not do so, bundles of straw should be placed under the hind quarter, or the posterior extremities may be raised by passing a rope round and above each hock and raising by pulleys attached to a beam, where possible, before replacement is attempted.

VACCINES. *See* Sero-Vaccine Therapy.

VAGINITIS.

Infectious Granular.—As this disease is highly infectious, prophylactic as well as curative measures are called for.

In the case of the former the diseased should be separated from the healthy, the sheds and pens thoroughly disinfected, and, needless to add, the affected should not be brought into contact with the bull until completely cured. Further, the bull's sheath should be douched occasionally, for the writer holds a strong view that this animal may act as a carrier although his generative organs appear clinically healthy. Lastly, it is advised that the healthy animals should be vaccinated. This will be discussed later. Curative measures consist in washing the buttocks, tail, and lips of the vulva with an antiseptic solution. When a large number of animals are affected an economical and effective dressing will be found in that recommended for contagious abortion (which see).

The vaginal canal is then irrigated daily with a solution of proflavine, 1: 4,000; permanganate of potash, 1: 2,000; or sulphocarbolate of zinc, 1: 500. Where the ulcers take on an indolent form, occasional touching with nitrate of silver tends to hasten resolution.

When constitutional disturbance is present, salines (laxative and alterative) are indicated.

In all cases the bull should be examined and treated with the above injections both for prophylactic or curative purposes.

Vaccine Therapy.—The primary aggressive organism appears to be a streptococcus, but secondary organisms such as diplococci and staphylococci may also be present. Vaginal swabs should be taken with due precautions, preferably from those cases in the initial stage, and from these a vaccine prepared.

Three doses, one given weekly, generally bring about recovery and considerably shorten the course of the disease, which without vaccination often runs a very indolent and slow course. Those animals which are not affected should also have three injections as a prophylactic measure, while the bi-weekly douche of a mild antiseptic is also recommended.

Gangrenous.—Gangrenous vaginitis is usually a sequel to parturition when dirty instruments, ropes, or hands have been used in the process of delivery.

As a rule there is considerable œdema of the vulva, which may extend to the anus, straining being a more or less constant symptom. The causal organism is the *Bacillus necrosis*.

Treatment at the outset consists of giving a saline aperient combined with treacle. Locally, the vulva is fomented with hot water to which has been added common salt and a little Lysol. The vaginal canal is then injected with peroxide of hydrogen (1 ounce) and normal saline solution (6 ounces), after which the mucosæ of the vulva and vagina are smeared with the following emollient:

℞ Pulveris Hydrogenii Peroxidi* Boro-Chloretone	.. āā ʒi.
Liquidum Paraffini	.. ℥ii.

M. Ft. lini.

This treatment should be carried out until all dead tissue sloughs away. In very severe cases extension occasionally takes place to the womb. These invariably prove fatal. Treatment in such cases consists of, in addition to the above, the administration of full doses of quinine, the subcutaneous injection of normal saline solution, and the injection over the scapula of an ounce of oil of turpentine.

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* Zimmerman and Co., 9, St. Mary's Hill, London, supply peroxide of hydrogen in powder form under the term Perkenol, which is most efficacious.

Vesicular.—Under this heading will be included the so-called condition known as " bull burn."

In the writer's experience the bull is the *prima facie* cause, although when that animal's generative organs are examined they may appear clinically normal; the bull in those cases, having been cured, becomes a " carrier."

On the other hand, the penis may be inflamed, the mucosæ ulcerated, and the sheath swollen.

Treatment consists of giving a saline purgative and irrigating the prepuce daily with those antiseptics recommended for granular vaginitis. In mild cases the penis and sheath soon regain their normal state, while others occasionally appear to defy all treatment. In these latter cases, unless the animal is very valuable for stud purposes, castration is recommended. After this operation it is astonishing to find how soon the post-inflammatory processes subside and the penis reaches a normal stage.

Treatment in the cow is simple and usually efficacious, consisting of two or three injections of any mild antiseptic douches.

Prophylaxis.—In all cases of vaginitis it must be remembered that bacteria are the root cause, and in some cases they appear to take on a very virulent rôle. The healthy animals should therefore be separated from the diseased, all discharges should be carefully disinfected, and the cowsheds freely washed with disinfectants. Finally, the bull's sheath should be irrigated with an antiseptic after each service.

VARIOLA.

From a therapeutical point of view the two animals requiring consideration here so far as this country is concerned are the horse and the cow.

Variola Equina.—The disease tends to show a variety of clinical phases, locating itself in various situations of the body. Thus one or more limbs may become affected, the situation usually being in the region of the heels; or it may appear in any part of the cutaneous surface; or the lips, buccal mucosæ, tongue, gums, may be the seat of the disease; or the nasal mucosæ may be attacked, and finally the generative organs may be the parts affected—*i.e.*, the anterior portion of the penis in the male, and the vulvo-vaginal mucosæ in the female. The clinical phenomena in all cases, if closely observed, show (1) papular, (2) vesicular, (3) pustular, (4) desiccative stages. Treatment consists of giving the animal an aperient, placing it on a light laxative diet, and dressing the affected parts with a solution of boric acid, peroxide of hydrogen, or proflavine, and in addition, where the oral mucosa is affected, a powder composed of boric acid 1 part, chlorate of potash 2 parts, chloride of sodium 8 parts, should be placed on the tongue once daily.

Prophylaxis consists in rigid isolation of the affected animal or animals, combined with the disinfection of all harness, clothing, brushes, etc., while the attendant, in the interest of himself and the other animals, should wash his hands once or twice daily in an antiseptic.

Variola Vaccina.—Cowpox as a rule runs a mild course; nevertheless, when it secures a foothold in a dairy of cows, from an economical point of view it sometimes acquires serious proportions—much more serious, in fact, than the average agriculturist recognizes. The following case may be taken as an illustration on the point: In 1919 the writer was consulted in regard to an outbreak in a dairy of seventy cows. Fifty were affected, some more severely than others, and as a milk record system had been in vogue in this dairy for some years a good opportunity occurred for noting the monetary loss incurred in such an outbreak. It was found that the average loss in milk *per diem* per cow was just under a gallon, making a total loss of 50 gallons per day, and this record was maintained for three weeks, bringing up the grand total to over 1,000 gallons. To this must be added the fact that three cows each lost a quarter.

In addition, two of the milkers were laid aside for a month with septic (pox) hands, the disease extending up the arms to the axilla. Then, of course, there was the cost of the medical treatment, the whole loss probably involving a sum of over £200. These facts are mentioned to show how neglectful the average stock-owner is towards his own interests when he is up against disease, and it is only by his medical adviser driving home points such as these that he can save him from the fruits of his own laxity and indifference. In some cows the teats become so sore that they are milked with difficulty. It is cases such as these that tempt the layman to milk with a teat siphon, a procedure invariably ending in acute mastitis and sometimes death. Such a procedure, therefore, cannot be too severely condemned by the expert.

Some milkers possess a more skilful milking capacity than others, and do not punish their cows in the process of milking. These milkers should be deputed to milk the worst cases. Further, prior to milking it is advisable to lubricate the teat with a soothing antiseptic emollient, more ointment being applied to the sores after each milking.

The healing of the pox sores on teats is usually a slow process in milch cows by reason of the fact that they are continually irritated in the process of milking, hence it is a large variety of healing dressings have been prescribed. The most soothing and healing ointment in the writer's experience is:

℞ Extracti Hamamelidus
Myrrhi .. .. .. āā ʒi.
Acidi Borici
Adipis Benzoati .. .. .. ℥ii.
M. Ft. ung. To be lightly applied before and after each milking.

The witch hazel and the myrrh in the above prescription both possess astringent and styptic properties. Where mammitis supervenes as a complication, treatment for this condition should be carried out.

Prophylaxis.—The healthy members of the dairy or herd should be separated from the diseased, and milked by independent milkers having no contact with the unhealthy cows. Further, each milker, for his own sake and for the cow's, should wash his hands in an antiseptic before and after milking each cow. Those milkers who have abrasions on their hands should not milk a "pox" cow. If the cows are not badly affected, the milk may be used after it has been pasteurized. Finally, the dairy should be well flushed night and morning with disinfectants.

VENTRAL HERNIA. *See* **Hernia.**

VERTIGO. *See* **Megrims.**

VESICAL CALCULI. *See* **Calculi.**

VESICATION. *See also* **Blistering.**

Blisters are applied to the skin to counteract inflammatory and post-inflammatory conditions. Vesication is not practised as much as it used to be, and, like some other relics of the past, it has fallen into disuse, not so much because it was found therapeutically wanting, but because its application was overdone at one time. Nevertheless, when used in suitably selected cases and at the proper moment, much benefit is derived from blistering. Although the word "vesicant" strictly means an agent which produces vesicles, it is proposed here to use it in its larger sense—namely, that of a "counter-irritant."

It may be asked, How do counter-irritants act therapeutically?

A blister applied to the skin produces a hyperæmia of the part, first by contraction of the capillary bloodvessels which is of short duration, and second by dilatation which is prolonged. This dilatation of the capillary wall facilitates diapedesis of the leucocytes and the effusion of serum. As the result of excessive cellular crowding many cells die, and by subsequent disintegration of these the serum acquires bactericidal, proteolytic, and antitoxic qualities. These latter have an important bearing when one is dealing with bacterial infections, and this valuable fact should be carefully noted here—a fact many clinicians may not be cognizant of. The fixed tissue cells—fibroblasts—under the irritation undergo rapid proliferation, which is responsible for the temporary thickening of the cutaneous and subcutaneous tissue following the application of a blister. The therapeutical value of this phenomena is seen in practice by the production of stiffness of the part simulating an artificial bandage.

Briefly, then, the four cardinal stages which take place as the result of vesication are: (1) Hyperæmia; (2) leucocytosis; (3) serous effusion; (4) fibroblast proliferation.

1. A superficial hyperæmia must of necessity draw from the general circulation cellular and humeral elements with which in acute inflammatory conditions the blood is overcharged. In so doing, where a deep-seated inflammation exists, a given degree of tension is thereby overcome in the affected area. A good example of this is to be found in cases of congestion of the lungs, when a blister applied to the chest gives considerable relief. The same salutary effect is obtained, but perhaps to a lesser degree, in the early stages of all visceral inflammations.

2. When one is dealing with a localized infection, especially of an indolent character, such as an ulcer which will not heal, an abscess which will not point, a tissue that will not clear up, the application of a blister stimulates phagocytoses which "scavenge" the affected zone and help to bring about resolution.

3. Some hours after applying a blister swelling occurs, largely due to effused serum, and it has been seen that this serum becomes rich in antibodies which in specific infections carry decided therapeutical value, for it becomes in due course absorbed into the general circulation and will, of course, reach the infective foci. Further, by reason of the mechanical influence it exerts locally it tends to prevent the spread of local infections. This is well seen in abscess formations, in malignant œdema, in erysipelas, etc.

A similar state is produced by the formation of a *fixation abscess*. The acute inflammatory œdema obtained by the subcutaneous injection of such irritants as turpentine, oil of origanum, acetic acid dil., a strong solution of chloride of sodium in specific infections has given the writer in some cases highly satisfactory results, and has been the means of saving many valuable lives. The abscess, of course, if proper precautions are taken, is a *sterile* one, and no danger can follow its formation.

4. Tissue-cell proliferation, under the stimulus of a counter-irritant, is indicated when reparative processes are defective or in abeyance,

as, for example, in slow-healing wounds; ruptured tendons, muscles, or ligaments; in some cases of fractures, etc.

From the foregoing brief observations it will be seen counter-irritants do hold an important place in the therapeutical rôle, and, further, that they are indeed scientific in their conception when applied with logical reasoning in suitable cases and at the right moment.

There are many forms of counter-irritants used in practice:

1. *Very hot water* applied to the skin acts as a blister.
2. Mustard and vinegar well rubbed into the skin and the part covered with paper. The stimulating effect is increased by adding turpentine.
3. The various kinds of stimulating liniments and embrocations, especially if the part is covered with oilcloth afterwards.
4. Setons—already described (see Setons).
5. Actual cautery (see Firing).
6. Blistering ointments.

The blistering ointments used in practice are many. The following are a few useful prescriptions:

℞	Hydrargyri Iodii Rubri	ʒi.
	Adipis Præparatæ	℥i.

M. Ft. ung. Rub well into the skin for fifteen to twenty minutes.

℞	Hydrargyri Iodii Rubri Pulveris Cantharidis	āā grs. xxx.
	Adipis Præparatæ	℥i.

M. Ft. ung. Rub in for fifteen to twenty minutes.

℞	Acidi Acetici Pulveris Cantharidis	āā ʒii.
	Oleum Terebinthi Oleum Olivæ	āā ℥i.

M. Ft. lini. Rub in for ten to fifteen minutes.

℞	Acidi Sulphurici	♏xv.
	Pulveris Cantharidis	ʒi.
	Adipis Præparatæ	℥i.

M. Ft. ung. Rub in for ten to twelve minutes.

This is a powerful blister to be used with care.

℞	Hydrargyri Iodii Rubri	grs. xx.
	Pulveris Cantharidis	grs. xxx.
	Oleum Terebinthæ	♏xx.
	Paraffini	ad ℥i.

M. Ft. ung. Rub in for fifteen minutes.

℞ Hydrargyri Perchloridi	grs. xxx.
Acidi Hydrochlorici	♏x.
Adipis Preparatæ	℥i.

M. Ft. ung. Rub in for ten minutes.

This is a strong blister, and must be used with care.

The application of a blister may appear to the inexperienced so elementary as not to require special consideration, and although there may be a certain amount of truth in the assertion, nevertheless there are several important points to be considered which, if overlooked, might culminate in disastrous consequences. The hair should be removed before application, and if the skin is at all dirty it should first be washed with soap and water. In visceral or deep-seated inflammations vesication should be carried out in the early stages, while *per contra* in superficial inflammatory conditions blistering should embrace the " end " treatment.

The strength of a blister depends upon the patient upon which it is to be used. Thus, a fine-skinned thoroughbred requires a weaker blister than a coarse-skinned shire horse or an ox or a pig.

Not more than two legs should be blistered at one time, and when all four legs require blistering it is advisable to treat, for example, the near fore and the off hind, and in a week or ten days the off fore and near hind. Where limbs are being blistered, when the irritative stage has been reduced the animal is given a run at grass for one to two months, but care should be taken to see that there are no mud holes or pits in the field, for dirt contaminating the blistered skin may set up poisoning. The angles of the limbs and also the cap of the hock must not be blistered. Prior to blistering, these parts should be smeared with some kind of grease. In diseases of the urinary system, cantharides, owing to the risk of absorption, should be sparingly used. In the case of the horse, he should be tied up short or a cradle applied to the neck to prevent him from biting the blistered parts. If re-blistering is necessary, a second application must not be carried out until all the effects of the first have passed off; this usually takes three weeks or a month. In young colts which cannot be tied up and a cradle is not advised, the writer makes a practice of fasting the animal all day, blistering towards night, and immediately turning out to grass. Being hungry, the patient appears to forget all about the irritating effects of the blister.

VITAMINS.

These may be defined as essential food elements existing in minute quantities and of a more or less unknown composition. Three have been recognized: (1) Fat-soluble A; (2) water-soluble B; (3) water-soluble C.

1. **Fat-Soluble A** is the growth essential, a deficiency of which is said to lead to rickets. It is found in herbage, in milk, cream, butter, eggs (yolk), beef fat, cod-liver oil.

2. **Water-Soluble B** is antineurotic and growth essential. It is widely distributed in peas, beans, and cereals (but only in the germ and layer immediately under the pericarp), in yeast, milk, liver, brain, vegetables, fish.

3. **Water-Soluble C** deficiency is supposed to produce scurvy. It is found in cabbages, swedes, turnips, carrots. There is a large field of investigation required to be unfolded before this important subject can, however, be placed upon a sound scientific basis.

VULVITIS.

Inflammation of the vulva is seen as the result of injuries, from difficult parturitions, from bacterial extension from the vagina. Treatment consists of applying hot fomentations followed by cooling lotions, and administering saline laxatives.

WARBLES. *See* **Parasitic Diseases.**

WHISTLING.

This condition may be temporary or permanent. In the former case it often follows acute laryngitis, strangles, influenza, while some animals will whistle when out of condition or when suffering from indigestion; in the latter it is a usual forerunner of roaring. In the temporary form cure can often be effected provided the disease has not advanced too far. The first step towards treatment consists in getting the animal "fit." He should then be placed on a rich diet composed of crushed oats, a few beans, boiled linseed, bran, the best hay chaff, and very little long hay. If he eats his straw bedding, he should be muzzled or bedded with sawdust, or moss litter. A biniodide of mercury blister having been applied to the larynx and extending from ear to ear, he is placed upon the following treatment extending over a month or more:

℞ Pulveris Nucis Vomicæ Potassii Iodidi Ferri Sulphatis	.. .. .. āā ʒii.
Sodii Bicarbonatis	.. .. .. ℥i.

M. Ft. pulv. Give one night and morning in manger food.

Should no improvement follow, the following may be tried:

℞ Strychninæ Arsenatæ	grs. ii.
Veratrinæ	grs. iii.
Sodii Iodidi	ʒii.
Sodii Bicarbonatis	℥i.

M. Ft. pulv. One powder night and morning in manger food.

If the case does not improve, medical treatment may be looked upon as futile, and the operation for roaring should be considered, provided the respiratory sound is sufficient to warrant it.

While under treatment the animal should commence with walking exercise, increased to trotting, and later, as he becomes fit, he should be "stretched out" with short gallops, thereby filling his lungs, stimulating the respiratory system, and toning his muscles.

While under treatment a mild physic ball may be given occasionally.

WHITE HEIFER'S DISEASE.

So far as the writer is aware, the pathology of this disease has never been worked out. The connecting link, therefore, between the clinical phenomena on the one hand, and the white hair of the affected animal on the other, is buried in obscurity. The fact that the patient, which is white in colour, suffers from this disease, moreover, cannot be looked upon as accidental, for it is questionable if any but a decidedly white-coloured animal ever suffers from it. In the case of melanosis in white horses one can associate the clinical data with the disappearing hair pigment, but in white heifer's disease no such analogy exists.

The first indication which strikes the owner that anything is amiss is given by the animal persistently straining ; this straining, as the disease progresses, steadily becomes worse.

The practitioner is consulted, and, on digital examination of the vagina, finds a dense, distended, outward convex barrier spread across the anterior portion of the canal. With digital pressure in those cases where the band has become attenuated it is possible to pierce it with the finger, in which case a seropurulent, foul-smelling fluid escapes. The band, however, may be so dense that piercing by means of a trocar is necessary, after which a finger is admitted, and the opening enlarged until in most cases the whole hand—fingers cone-shaped—is passed through, thereby making the opening so large that post-operative closure becomes impossible. When the fluid has become evacuated by the animal straining, a mild antiseptic to which is added a little salt and bicarbonate of soda should be injected. This injection is repeated for the next two or three days, the recovery being then usually complete.

WHITE SCOUR.

A highly fatal and infectious disease, it affects principally young calves at or soon after birth, in which an organism of the *B. coli* group plays a major part. The disease is so virulent that when once it is established medicinal therapy offers small chances for recovery, for in most cases it becomes a classical septicæmia. The writer on many occasions has isolated the organism from the free circulation during life, and immediately after death from the heart blood, spleen, kidney, liver in pure culture.

In some cases the calves are born so weakly and die so soon after birth that one is almost tempted to conclude that the disease is contracted *in utero*. But it may be argued that it has been satisfactorily established the T.B. does not pass from the maternal to the fœtal blood, and why should another organism of about the same size? While this argument is perhaps a potent one, it is just possible that an ultra-microscopic virus is at work, making an excellent medium for the coli group of organisms to hold sway upon; or the aggressive organism may be an involution form. These are theoretical points which may or may not be correct, and if they do nothing more than indicate that much research work requires to be done before white scour is completely understood, they will fulfil the motive of the writer in recording them.

Again, some authorities assert bacteria gain entrance to the system by the navel, and although on clinical grounds this view may be correct in some outbreaks, it completely breaks down when applied to others. White scour, as seen in practice, therefore appears to take on various forms.

While the bacteriology of this disease is little understood, its therapy is based on sounder grounds.

Treatment consists of the early injection of immune serum; in addition, the writer advises a dose of the same serum *per oram* night and morning, the reason for this being that immune serum coming in contact with the mucosa harbouring the infective bacteria, these organisms are prepared for phagocytosis and their destruction by the natural body forces made easier.

In addition, the pathological phenomena should be treated. The gastro-intestinal contents are always highly acid and the mucous membrane inflamed; therefore, antiseptics, antacids—astringent—and sedatives are indicated.

℞	Acidi Borici	grs. xv.
	Sodii Benzoas	grs. xii.
	Tincturæ Chloroformi et Morphæ	♏xx.
	Creta Preparatæ	ʒi.ss.
	Aquæ Menthæ Piperitæ	ad ℥i.

M. Ft. haust. To be given three times a day in flour gruel.

Prophylaxis.—From an economical point of view prevention is the soundest method of procedure, and we must begin in the latter months of pregnancy by producing hyperimmunity in the expectant mother through vaccination.

The following is the method of procedure adopted by the writer for the last eight or nine years on those farms where infective scour is very prevalent: Each pregnant cow is inoculated with a vaccine, preferably between the sixth and seventh month of pregnancy, three injections being given to each, ten or twelve days apart.

The vaccine is derived from calves belonging to several outbreaks, thereby making it polyvalent and composed of *B. coli*, streptococci, and pasteurella. At birth the calf receives a subcutaneous injection of anti-coli and antistreptococcal sera, 10 c.c. of each, and this may be repeated if necessary in eight days. The navel cord is painted daily with tincture of iodine as a precautionary measure. The calving pen should be made sanitary by the free use of disinfectants.

WHITLOW.

Whitlow—so called—of the claw in cattle, if neglected, is a troublesome disease in which amputation is sometimes necessary. If the case is seen in the early stages the painfully inflamed swelling should be counteracted by hot antiseptic foot baths or poultices and the application of Bier's treatment (which see).

Should signs of suppuration occur, the abscess must be immediately lanced, for the pus tends to run round the coronet and involve the joint, often setting up bone necrosis. After evacuating the pus the cavity is curetted. This is best done by casting the animal, and applying a tourniquet so that, when the curette is used, operative hæmorrhage does not conceal from the surgeon the diseased areas which demand thorough scraping. The cavity is then packed with gauze soaked in peroxide of hydrogen and the foot bandaged. In two or three days the wound is examined, and if it is healthy and granulating, re-dressed. If pus is oozing from a recess it must be probed and the curette again used, the wound this time being packed with B.I.P.P. and bandaged as before. This dressing is repeated as often as necessary. When the cavity has become sufficiently filled, the bandage may be left off and the whole area smeared daily with a tar dressing. At this stage, when possible, the animal should be turned out to grass, moderate exercise being conducive to healthy healing. In advanced cases where bone necrosis has set in amputation is called for (see Amputation, Claw).

WIND GALLS.

Wind galls—so called—are usually situated in the region of the knee and fetlock. They are most commonly seen in horses doing fast work. Their presence may be an eyesore only, or they may cause a degree of lameness. Various methods are adopted for their eradication or reduction. If they are painful and inflamed the animal should be rested, given a dose of physic, placed on low diet, and hot fomentation applied to the part, followed by a cooling lotion such as arnica and white solution. Later, blistering and rest is indicated. In the non-painful cases reduction may be effected : (1) By using elastic bandage compresses. (2) By applying a mercurial emplastrum and bandaging, tightening the bandage as the swelling subsides. (3) By blistering (biniodide of mercury, 1 to 8). (4) By firing (line). (5) By firing, pyro-puncture. This latter method is best done by using a moderately fine needle, which is passed through the skin into the cavity and allowing the synovia to escape. A mercurial blister is then applied, and the animal tied up so that there will be no risk of contaminating the wound. (6) By aspirating the fluid and injecting tincture of iodine under sterile precautions, and covering the joint in cotton-wool over which an elastic bandage is applied and kept there for a week or ten days. After removal a strong blister should be applied.

WIND-SUCKING. *See* **Crib-Biting.**

WOODEN TONGUE. *See* **Actinomycosis.**

WOOL-EATING (SHEEP).

This habit may be cultivated by lambs or adult sheep. In the case of the former the wool in the region of the mamma must be clipped away. In the case of the latter bran and hay should enter into the diet, and if they are being fed on roots a run on grassland is advised. Medicinally an occasional dose of bicarbonate of soda (2 drams) and carbonate of magnesia (1 ounce) will often allay gastric irritability and suppress the habit.

WORMS. *See* **Parasitic Diseases.**

WOUNDS.

The treatment of wounds must ever loom largely in the consideration of the veterinary surgeon. Following upon Lister's introduction of antiseptic surgery a revolutionary change took place in the treatment of wounds. But although Lister's conceptions were brilliant beyond words and far-reaching in effect, like many other great discoveries they could not be described as altogether new. For example, in pre-Lister days the scourge of all surgical wards was hospital gangrene. Suffice it to mention, as a single illustration, that there was an institution in Edinburgh which made a routine practice of immersing the stump of the limb in alcohol immediately after amputation, and by this measure the fatalities from gangrene were considerably reduced. Lister's doctrine was to dress wounds with agents which he knew had a destructive influence upon pathogenic bacteria, chief of which was carbolic acid, and this dictum held sway for many years, almost until Wright and others demonstrated that certain elements of the body also possessed great power in the destruction of bacteria, and, further, that some of the antiseptics introduced by Lister and others had a depressing influence upon Nature's protective and healing elements, thereby in a large sense defeating the aims of their original advocate. A complete understanding of what these protective agents are and how they act is an important corner-stone in modern surgical therapy, and should be carefully studied by all those who aim at being abreast with present-day surgical science. These will be discussed later. For descriptive purposes accidental wounds as seen in practice are *aseptic* and *septic*, but as the former are so rare and give little trouble in comparative surgery they need not enter into consideration here. Further, wounds are divided into (*a*) incised; (*b*) punctured; (*c*) lacerated; (*d*) contused.

(*a*) **Incised wounds** are seen in surgical operations or accidentally made by some sharp object, and in those cases the edges being clean cut, with little or no damage to adjacent tissue, healing is more or less easy, unless of course there is pronounced septic contamination.

(*b*) **Punctured wounds** are those in which the cutaneous injury is out of all proportion to the depth of penetration. All experienced practitioners know how dangerous these wounds are. To the layman the seat of puncture may be so small as to escape his notice altogether, or if detected its insignificance disarms him, with the result that he does not call in expert aid usually until grave septic lesions have set in, seriously endangering the life of the patient. It is probable that more animals' lives are lost through punctured wounds than by any other type of injury. All punctured wounds must therefore be looked upon as a serious menace to life from the outset, and treated as such.

(*c*) **Lacerated wounds** are those showing irregular edges, with laceration or tearing of the deeper structures. They are usually caused by blunt objects coupled with considerable impact, as is obtained, for example, in collisions.

(*d*) **Contused wounds** are those in which there is a considerable degree of blood extravasation or effusion of serum in and around the injured area. They are usually the result of collisions or kicks.

Healing of Wounds.—In the healing process various phases are noted, depending largely upon the nature of the wound, the surrounding circumstances, and the patient itself.

Immediate union takes place when the severed surfaces are brought together and coalesce without the formation of any newly formed material acting as a bond of union. For this ideal to take place, complete immobility and absence of inflammation is most essential. As will be readily understood, this method of healing is exceedingly rare in comparative surgery.

Primary adhesion is a more complicated process, for here inflammation plays a part. As the result of mechanical injury or subsequent exposure, or both, a mild but nevertheless an acute inflammatory process is established, the cut surfaces being covered by a fibrinous exudate. Now if these two glazed surfaces are brought together, the fibrin acts as a cement and glues them together, so to speak, but the bond of union thus produced is not permanent, and if repair were to stop here the wound would subsequently gape, owing to the fibrin breaking down. If the union is to be permanent we must have the production of *formative cells,* constituting granulation tissue, and in addition new bloodvessel formation, so that the parts may obtain nourishment, etc. These cell formations and the budding of bloodvessels replacing the fibrin may be very limited, and the whole process in the case of small healthy wounds occupy only a day or two.

Union by first intention is a term usually applied to include both of the above described conditions.

Union by second intention or by granulation. This process is a much more elaborate and prolonged method of healing than any of the foregoing. A solution of continuity of the skin and subcutaneous structures is immediately followed by an outflow of blood. This in due course ceases by the power of coagulation which the blood-content possesses.

Some hours later, oozing from the wound, there will be noted a straw-coloured, more or less clear fluid—lymph. This fluid later on becomes opaque, constituting pus. As a result of the inflammatory process consequent upon mechanical injury, augmented by the growth and development of pathogenic bacteria, leucocytes in great numbers are attracted to the inflamed zone. They immediately attack the infective bacteria—positive chemotaxis. Many fall in the fray and are cast off; many become sickly and later die; others withstand the shock of the bacteria and their toxins and are fortified for further warfare. Pus therefore discharging from a wound must be regarded among other things as an index of Nature's effort to thwart infection with the object of facilitating repair. This point and the lessons it teaches will be discussed later. If a closer examination is now made of the wound, it will be found studded all over with fine granulations—granulation tissue. If the irritation is great, granulation goes on apace, constituting what is commonly called "proud flesh." If the irritation becomes reduced, or when protection from irritation is complete, fibroblasts form, which eventually go to make up fibrous tissue, filling in due course the wound cavity. This scar tissue in time cicatrizes, thereby hastening the healing process.

Healing under Scab.—Here the wound becomes covered by a thick layer of coagulated lymph containing in its matrix degenerated tissue cells, blood, and often bacteria. When a scab is firmly set over a wound, the ingrowing epidermal cells cease functioning at the margin of the scab. Consequently, one finds in practice, if a scab is allowed to remain until it falls off of its own accord, that the ultimate end will be a circular bald patch. To overcome this the wound should be protected from the air by a healing ointment, which acts as a varnish, and the scab picked off as soon as it has formed. By this means blemishes are considerably reduced. This point is fully discussed under broken knees.

Wound Infection.—In comparative surgery, if one excludes surgical wounds, nearly every abrasion seen in practice is infected at the time of injury or soon after; but fortunately the majority of animals possess a high degree of immunity, so that the infection remains local throughout, with, as a rule, small danger to life.

This observation is not, of course, applicable to such specific diseases as malignant œdema, black-quarter, anthrax, tetanus, septicæmia and occasionally erysipelas, tuberculosis, actinomycosis, etc.

The question may be asked, Why do some wound infections remain local while others become generalized?

This is a large and complex one, but the answer with our present knowledge is on the whole satisfactory, and is briefly this: Take anthrax as an example. Here we have a very virulent bacterium which no sooner finds itself in a medium suitable for its growth than it develops rapidly, giving off potent toxins. The phagocytes first attracted to the bacteria are soon repelled, as witness the fact *healthy* pus is not formed. The first line of defence, the *unabraded* skin or mucous membrane, having been abraded, has gone. The second line in the active tissue cells, including the phagocytes and the antibacterial lymph, unable to cope with the onslaught, has given way, leaving the lymph and blood channels free to general invasion, and a veritable vicious circle is established. The best example of this condition is probably seen in anthrax in cattle, where the protective forces of the body appear rapidly to give way. The horse and pig, under similar conditions, put up a better and more heroic fight. Here we find that the disease tends to become localized, Nature's barriers against general invasion being more effectual, the general circulation remaining comparatively sterile throughout. These facts would point to the horse and pig possessing a higher degree of immunity against the bacillus of anthrax than the ox.

Now let us take an organism belonging to the least virulent type—the staphylococcus, for example—and what do we find? No sooner do these bacteria take up their abode in a wound than Nature's offensive and defensive forces are called up. The already inflamed condition of the wound has determined a large array of phagocytes to the part. The organisms are continually being bathed in the oozing serum, which is preparing them for the phagocytic feast (opsonic theory) and the actual war begins. A phagocyte attracted to a coccus—positive chemotaxis—begins by amœboid movements to envelop the organism, and in due course digests it. Having "tasted blood," so to speak, it thirsts for more, and, what is more important, its protective armour against bacterial aggression has become fortified, or in other words it is rapidly acquiring immunity against the poisonous influences of that particular organism. On the other hand, the bacterium may be so virulent that it destroys the leucocyte, with the result that the latter dies and is cast off, or it may become so sickly as to become non-combatant. It is these dead and used up phagocytes combined with the effused lymph that constitute pus. In addition to the phagocytes, the serum also possesses important bodies which assist in bacterial destruction. In the meantime the cellular elements surrounding the wound have become hyperactive, thereby acting as a barrier to the progressive extension of the bacteria. Before this barrier has been made secure, however, some bacteria may escape into the circulation, but unless they are very virulent they are soon destroyed, or they may be taken up by the lymph stream, in which case the adjacent lymphatic glands become inflamed. If the organisms are very aggressive and reach the blood-stream, a generalized septic infection follows, an example of which is seen in septic infection, or the toxins alone may be absorbed, as, for example, in quarter evil, tetanus, malignant œdema, constituting toxæmia. These observations bring us to consider the question of the pus, its clinical significance, and the important lessons it teaches. Following upon Lister's doctrine, pus was looked upon in the light of "an unclean thing" by all surgeons, and although this is quite true in aseptic surgical operations, we shall endeavour to show, in certain wound infections at least, *provided the pus is of the right kind*, that its presence is not altogether objectionable, and, further, that its condition, if properly interpreted, is an important index of the progress or otherwise of the wound. It is therefore a valuable aid to prognosis, diagnosis, and collateral treatment.

In this sense the old-time practitioners, who looked upon pus as of two kinds—*i.e.*, *laudable or healthy* and *unhealthy* pus—were far ahead of present-day clinicians, who fail to recognize the distinction.

Laudable pus is a thick, whitish, tenacious, creamy fluid rich in leucocytes in various stages of degeneration showing they have come through an ordeal with the invading bacteria, and dead and dying bacteria suspended in a fluid—the *liquor puris*. Laudable pus therefore indicates that Nature has put up a bold fight against the invader, and that she is on the high-road to win through; that phagocytosis has been particularly active, and that the serum is rich in immune bodies.

Unhealthy pus, if it is thin, suggests a deficiency of phagocytes. This may be due to a variety of causes. If the wound is old standing, such as is found in fistula, the wall may have become so indurated that the leucocytes are unable to migrate to the infective foci or the vital forces may be so reduced and blood-pressure so lowered that the cellular and humoral elements are too attenuated to exert a fighting attitude, being deficient both in quantity and quality. The pus in this case is thin and scanty.

If the pus is watery—called sometimes ichorous pus—it indicates phagocytosis is absent, that negative chemotaxis is much in evidence, and this is invariably due to the fact that the bacterial infection is a very severe one, and through their aggressiveness the body immunization mechanism has broken down, the outlook being grave. A good example of this condition is to be found in malignant œdema and anthrax. If the pus is thin and bloody—sanious—it suggests, in addition, the newly formed capillary walls are breaking down, usually from ulcerative processes, or it may be due to the granulation tissue being soft and flabby, with the possible addition that the patient's calcium content is deficient. It will therefore be seen that pus teaches a valuable lesson to those who take the trouble to interpret its meaning, serving thereby as a *diagnostic* agent. But pus—laudable pus—is more than that: it is a *curative* agent also, doing its work assiduously under the eyes of the surgeon and often unknown to him. This may seem a strange assertion to many, while to others it may sound like rank heresy. Let us see. Of recent years pus has been proved to contain a tryptic ferment (Wright). This ferment possesses the power of auto-digestion, and is derived from the leucocytes found in the pus which are undergoing disintegration. By this property it keeps down over-granulation, which in some cases would act as a serious menace to wound healing, for in many instances these granulations have pockets or cavities, which tend to lodge the most active bacteria; it checks over-induration of sinus and abscess cavities, which, as we have seen, is inimical to free leucocytosis; it assists in the separation of false membranes and the removal of sloughs. Recounting these valuable processes, where is the clinical worker who does not welcome all of them? But it must be pointed out, however, valuable as these functions are, for their successful attainment the surgeon should be assured of one thing—*i.e.*, the *pus must not* be allowed to *stagnate;* in other words, the elimination of stale and the renewal of fresh pus is essential for recovery, the former, of course, being achieved by free drainage. It will be seen, therefore, that "laudable" pus discharging from a wound is a salutary symptom, and the layman's conception when he exclaims, "The wound is discharging well," has a sound surgical ring about it. Like everything else, however, it should have a limited duration, for it is obvious, so long as a wound suppurates, it will not heal, or, in other words, we have a chronic discharge. There are a variety of forces at work to account for these *chronic* suppurations.

Pus, by reason of its *tryptic content*, burrows, and this capacity would prove a veritable danger to life if its course remained unchecked, as may be readily understood; but Nature, in her wisdom, has warded against this catastrophe by supplying the blood-fluids with an *antitryptic* power, and it is this safeguard that preserves the tissues round the pus-laden wound or abscess cavity from a progressive destructive auto-digestion. It is also interesting to note that this *antitryptic* blood-content is increased during the course of suppuration. Further, it is quite conceivable, if this antitryptic power is highly developed at the outset, or if it responds rapidly and excessively, so that the tryptic content of the pus is over-counterbalanced, that we shall find excessive induration replacing pus formation, as, for example, in those fleshy growths found in some cases of fistula of the withers, the substance of which is studded with small attenuated abscess foci. This state of affairs is probably also at work in those cases of old-standing sinuses and abscesses where the walls have become so indurated as to exclude phagocytosis and the oozing through of the bactericidal serum. It also partly explains why the pus "does not run" and why sloughs do not separate.

On the other hand, a low antitryptic power of the blood-serum in the early stages of pus formation would conceivably account for deferred healing by continued auto-digestion, a good example of which is to be found in poll evil and fistulous withers. From the foregoing observations, superficial indeed as they are, it will be gathered that Nature's wound therapy belongs to a very complex and interesting order, and the writer ventures to hope that their mention here will stimulate a more reasoned line of treatment and replace the rule of thumb principles so much in vogue in general practice. Fortunately for the practitioner of comparative surgery, the balance existing between the tryptic auto-digesting power of the pus on the one hand and the antitryptic content of the blood on the other is a very flexible equation, so that Nature responds to the occasion in a large percentage of the cases one sees in practice. Further, phagocytosis, coupled with the bactericidal action of the serum, supplies valuable additions to the protective and curative rôle. When these lag, however, for any reason or reasons, the surgeon must use his energies to stimulate. How this can be done is embodied in the treatment of wounds.

Wound Therapy, General.—To discuss in the minutest detail all the points involved under this heading would be beyond the scope of this work; the writer must therefore confine his observations to those having a direct bearing to the practical side only. Before discussing these we must consider the types of bacteria present in wound infection. If a wound is sterile or presumed to be, the edges should be brought together by sterile sutures and needle, which must pass through a sterile skin or mucous membrane, as the case may be, and in the case of the former the wound is then sealed with collodion or some such agent which will exclude the germ-laden air. Over this, when practicable, sterile gauze is placed and the part bandaged. If sterility is complete, the bandage, dressing, and sutures should not be removed until sufficient time has elapsed for a complete union to take place. In veterinary practice this procedure applies mainly to surgical wounds, for few others are sterile. In the event of suppuration occurring the dressings and collodion must be removed, and one or more sutures cut away to allow drainage. The wound cavity is then irrigated with a *mild* antiseptic, lightly painted with tincture of iodine, and rebandaged daily, or it may be considered advisable to irrigate two or three times a day, leaving the wound open.

Accidental wounds, if they are sterile when first seen by the surgeon, as a rule soon become septic, the degree of septicity depending upon the type of the invading organism on the one hand, and the extent of exaltation of Nature's protective mechanism on the other, both local and focal; hence it is one finds in practice all grades and degrees of wound infection.

To know what type of organism one is dealing with, smears should be made from the discharge, stained, and examined microscopically. To carry out this procedure in *routine practice* would, of course, be ideal surgery, but it is scarcely practicable, nor is it altogether necessary, save in those cases where a virulent infection is suspected or where the case "hangs fire" under ordinary treatment.

Organisms present in Wound Infections.—The bacteria found in ordinary infections are staphylococci, streptococci, *B. coli*, *B. pyocyaneus*, *B. necrosis*, and organisms belonging to the diphtheroid group; while those of the virulent class are *B. œdematis maligni*, *B. tetani*, streptothricosis, *B. tuberculosis*, *B. chauvœi*, *B. anthracis*, *B. mallei.*

Staphylococcus pyogenes.—Of this there are three principal varieties—*i.e.*, *aureus*, *albus*, *citreus*. It occurs in irregular groups like a bunch of grapes, in pairs, or singly. It is *aerobic* and *facultatively anaerobic.* It is stated that 1 to 1,000 mercuric chloride destroys the organism in from five to fifteen minutes. In the writer's experience the *albus* is most commonly met with in practice, and it appears to be the most virulent of the three. The staphylococci are found most commonly infecting wounds, and in abscess formations. In some cases they are alone, or streptococci or other types of bacteria may be present. They produce a toxin which has a depressing effect upon the tissues, and consequently upon repair. Their absorption into the blood or lymph stream is rare, hence metastasis from this organism is seldom seen in animals.

The pus is usually thick, tenacious, and creamy.

Streptococcus pyogenes.—Of this organism there are several variants, each possessing a greater or lesser degree of virulence. They multiply by fission in one direction only, hence their formation is chain-like. The organism is *aerobic* and *anaerobic;* it is destroyed by carbolic acid 1 to 300 in two hours. Commonly found in wounds and abscesses, either alone or in conjunction with other bacteria, especially the staphylococcus, it often becomes very virulent, gaining access to the system, producing pyæmia and other terminal infections.

The pus is usually thick, tenacious, and creamy.

Bacillus coli communis.—This organism is both *aerobic* and *facultatively anaerobic.* It is often associated with the preceding bacteria, but it may appear as a primary wound infection. When this bacterium predominates, the pus has a dirty brownish appearance, somewhat thin in consistence, and giving off a characteristic foul odour, owing to its gas-producing power.

Bacillus pyocyaneus.—This organism is occasionally found in wounds, in which case the discharge is thick, tenacious, and coloured blue or light green. It can take on a very virulent form, producing considerable œdema round the wound, but the reaction is mainly local.

It is a *facultative anaerobe* and chromogenic.

Bacillus necrosis.—It appears that this organism mainly attacks injured and dying tissue, particularly those of low vascularity; thus it is seen associated with wounds of the extremities, lateral cartilages, the ligamentous structures of the poll and withers, etc. It is an *anaerobe.* The pus produced by this bacillus is thin, dirty in colour, and gives off a sickly odour. Its activities are largely local.

Diphtheroids.—To this group belongs a class of bacilli resembling the true diphtheria bacillus. They are invariably found associated with other organisms, but it is questionable if in that capacity they ever take on a seriously aggressive tendency. They are true *aerobes*, and appear to have a preference for *chronic* suppurating wounds.

Bacillus œdematis maligni.—This bacillus is a *strict anaerobe*, hence its development is more sure in deep-seated than in superficial wounds. It is usually accompanied by other bacteria, and, owing to its highly virulent character, the protective mechanism soon breaks down, so that phagocytosis almost from the outset is in abeyance. The tissues round the wound are œdematous, highly coloured, and deeply bathed in a foul-smelling sero-sanguineous fluid, which on discharging from the wound is often frothy, due to gas formation. The *B. welchii* is often associated with this organism.

Bacillus tetani.—A strict *anaerobe*, this organism will not grow in superficial wounds unless all air is excluded by firmly seated scabs. The moral, therefore, is never to allow a wound to heal under scab if possible. The writer has seen several cases of tetanus develop where this simple precaution has not been exercised, with serious results. Wounds caused as the result of a severe impact—as, for example, broken knees—are a common source of " lockjaw," the reason here being that the force caused by the fall drives the infected soil deeply into the soft structures embedding the organism well away from the atmospheric oxygen.

As there is usually a mixed infection in tetanus contaminated wounds, the pus is as a rule of a more or less *healthy* kind. Pus in these cases, possessed of a highly tryptic power, tends to act as a prophylactic by digesting the tissues and separating thereby the tetanus bacilli laden zone before a sufficiency of its toxins is formed.

Streptothricosis.—This group composes the *Streptothrix actinomyces*, *Streptothrix nocardii*, and *Streptothrix canis*, so far as the lower animals are concerned. The fungus is *anaerobic*, but it may grow also under *aerobic* conditions. A discharging wound always shows a mixed infection, the secondary bacteria usually being streptococci and staphylococci. The pus, if the infection is mixed, is thick, creamy, and tenacious, and if closely examined it will be often found to contain small yellow granules.

Bacillus tuberculosis.—Open wounds in animals seldom harbour this organism, but, if thus infected, are probably most commonly seen in the tubercular udders and joints where the focus has become contaminated by secondary bacteria, the encapsuling zone having given way by the auto-digestive processes of the pus. The pus is usually thick, creamy, and tenacious. The bacillus is *aerobic* and *facultatively anaerobic.*

Bacillus chauvœi.—Strictly speaking, this organism is not found in wounds proper, but it causes grave disintegration of the subcutaneous tissue, which if cut into will permit the outflow of a thin, sanguineous fluid laden with the slender bacillus of black-quarter. There is pronounced gas formation. The organism is a *strict anaerobe.*

Bacillus anthracis.—Anthrax contaminated wounds are seldom detected in animals by reason of the fact that the animal often dies before expert advice is sought for, and, further, the wound is more often located in the mucous than in the cutaneous structures. The organism is *aerobic* and *facultatively anaerobic.* The discharge, when present, is sero-sanguineous.

Bacillus mallei.—The glanders bacillus may be isolated from the ulcerous wounds on the nasal septum, and from the lymphatic glands and vessels situated under the skin in various parts of the body. The discharging pus is usually somewhat thick in consistence, tenacious, and having a glairy, straw-like appearance. The organism is *aerobic* and *facultatively anaerobic.* It is but slightly resistant to antiseptic agents; a 1 to 5,000 mercuric perchloride solution destroys them in three to five minutes.

From these observations it must be conceded wound infections belong to a very wide and diverse order.

Wound Therapy, Special.—For descriptive purposes wound treatment may be divided into three parts—*i.e.*, (*a*) chemical therapy; (*b*) surgical therapy; (*c*) biological therapy.

(*a*) **Chemical Therapy.**—A very large variety of agents are now used in the treatment of wounds, the tendency being to select those which are known to possess a high germicidal power, while at the same time not interfering with the healing cellular and humoral elements of the body. The following are a few of the most common in use:

Proflavine and acriflavine are recent discoveries possessing powerful germicidal properties, while not interfering with the antibacterial power of the serum or the activities of the phagocytes. These agents are best dissolved in normal saline solution in strengths of 1:2,000 to 1:4,000. They are useful in all forms of wound infection, especially in those which tend to pocket formations, and are non-toxic.

Eusol.—This preparation was suggested by Lorrain-Smith, and is prepared by mixing equal parts of dry bleaching powder and boric acid. Take 25 grammes of each and add 1 litre of water, shake, allow the solution to stand overnight, and filter. It may be used for irrigating septic wounds in the usual manner, or by Carrol-Dakin's method. It is said to possess pronounced tryptic powers, hence it is useful in hastening the separation of sloughs.

Sodium Hypochlorite Solution.—This agent was introduced by Carrol and Dakin. The strength must not be above 0·5 per cent. or under 0·45 per cent. It is prepared as follows: (*a*) Place in a 12-litre bottle 184 grammes chloride of lime and 5 litres clean water; shake and leave overnight. (*b*) Make solution of 92 grammes of anhydrous carbonate of soda and 76 grammes of bicarbonate of soda in 5 litres of clean cold water. (*c*) Add the sodium solution to the chloride of lime solution, shake, and allow to settle; half an hour later siphon off, filter, and bottle. Keep in a cool dark place.

This solution is placed in a container attached to which is a rubber tube. The distal end, with lateral perforations, is inserted into the deeper wound pockets, and the solution allowed to slowly gravitate every two or three hours. By this method of irrigation dead tissue sloughs more easily and drainage tubes are not necessary. This is an ideal method of wound therapy, but its rigid application in comparative surgery, especially in country districts, is not always easily carried out. When one is dealing with a serious case, however, the extra labour entailed will be well repaid.

It is especially indicated in extensive septic wounds with deep pockets, and in troublesome sinuses where drainage is difficult or impossible.

Hydrogen peroxide is a very useful antiseptic. In dilutions of 1 to 4 in normal saline solution it forms an excellent wound dressing. When the agent comes in contact with organic matter it decomposes, liberating free oxygen. It is therefore specially indicated for use in anaerobic infections. Further, it does not appear to interfere with phagocytosis.

Iodine, preferably in aqueous solution, is a useful germicide. The writer finds 1 ounce of tincture of iodine dissolved in 10 ounces of normal saline solution an excellent wound dressing.

Mercuric biniodide forms a very useful antiseptic in routine practice, but should not be used stronger than 1 : 4,000, and, further, it must not be left to " stagnate " in the wound.

Mercuric Perchloride.—This much used and much vaunted antiseptic has many surgical adherents in 1 in 1,000 strength. The writer long ago has discarded this agent from routine work, owing to its irritant qualities, its great power of coagulating albumen, and its decided tendency to thwart Nature's reparative processes. Where a mercurial salt is favoured, the biniodide has much more to commend it than the perchloride.

Potassium permanganate is a useful non-irritant antiseptic, which property it possesses by reason of the fact it gives off oxygen when coming in contact with organic matter. It is therefore useful in anaerobic infections. The strength of the solution is usually 1 : 500 to 1 : 1,000.

Formalin, a powerful antiseptic, but, being irritant and caustic, must be used with great care and well diluted in strengths of 1 : 500 to 1 : 1,000. It is not advised in deep wounds or where drainage is defective.

Lysol is a clean antiseptic which has been much used in recent years for dressing wounds in strength of 1 to 100.

Carbolic acid, one of the oldest of germicides, still retains many adherents, although it possesses distinct powers of coagulating albumen. This drawback can be reduced, however, when it is mixed with oil instead of water. The strength used is usually 1 to 50.

Boric acid is principally used as a dry dusting for wounds.

Iodoform is also used as a wound powder dressing, either by itself or in conjunction with boric acid and oxide of zinc. For dressing wounds in dogs and cats, iodoform, owing to its toxic properties when swallowed, should be used with great care.

B.I.P.P.—Morrison introduced within recent years a mode of wound treatment which must appeal to all practitioners of comparative surgery, owing to the simplicity of its application and the little subsequent attention the wound requires. The dressing is used in the form of a paste—*i.e.*, subnitrate of bismuth 1 part, iodoform 2 parts, liquid petroleum q.s. By this method the wound is cleaned from all pus, debris, etc., and bleeding stopped, dried with gauze, bathed with alcohol, smeared with paste, and sutured. If all goes well, redressing need not take place for from four to seven days.

Hypertonic Saline Treatment (*Wright*).—This mode of wound treatment was perfected during the European War, and, like many other discoveries, was in itself not really new, although its mode of application undoubtedly is. The writer has lavaged wounds with saline solution for twenty years, and doubtless there are many other practitioners who can make similar claims.

The treatment is specially useful in serious infections of wounds, especially when there is a tendency to sloughing and when there are pockets and defective drainage.

Under this method of treatment there are recognized two classes of organisms:

1. Serosaprophytes, a large group which are unable to grow on unaltered serum or blood, but only on discharges which have lost their antitryptic power or their normal degree of alkalinity.

2. Serophytes, a small group which grow on unaltered blood or serum, composed of streptococci and staphylococci.

The wound is lightly packed with gauze soaked in a 5 per cent. solution of chloride of sodium, and the whole covered with oilcloth to prevent evaporation, and redressed every seven or eight hours, or the wound may be irrigated with the solution by gravitation. The value of this treatment lies in the fact that the barriers usually found in septic wounds are overcome, allowing Nature's cellular and humoral elements to reach the infective foci under circumstances most favourable for bacterial destruction.

Having briefly reviewed the principal germicidal agents and their mode of application, the young practitioner may be somewhat exercised in his mind in making a choice. In this he must be guided by circumstances, not only in regard to the wound, but also in the patient's surroundings. If the case is seen early and before extensive bacterial contamination has taken place, irrigation with a mild antiseptic daily and precautionary measures taken to prevent reinfection is all that is as a rule necessary. Where deep tissue infection is present, followed by death of certain areas, one is called upon to exercise more ingenuity and adopt Wright's or Carrol-Dakin's method, although in some cases much good may follow adopting the simpler technique of Morrison. Or the old-fashioned, but nevertheless by no means to be despised, dressing composed of creosote 1 dram, terebene 2 ounces, rape oil 8 ounces, may be used. Gauze or tow is soaked with the dressing and inserted into the furthermost pockets of the wound, repeating daily for some days. It is astonishing how quickly unhealthy wounds become clarified under this treatment.

From what has been already said about pus it will be conceded that an index of treatment will be found in this material.

If pus is scanty and unhealthy, it can be increased and improved by hypertonic saline irrigation, by hot fomentation, by Bier's treatment where practicable, by the use of the curette, and by the systemic and local application of such a lymphagogue as citrate of soda. The creosote and terebene dressing just mentioned also appears to exercise a specific action in stimulating phagocytosis. If the pus is excessive and persistent, the cause must be found and removed; this is possibly due to the presence of a slough acting as an irritant and focus of infection. Wright's or Carrol's treatment is here advised, combined with suitable surgical measures.

In some cases one finds a wound persistently discharging, maybe, *laudable* pus, and without any apparent cause, which seems to defy usual treatment. The writer in these cases packs the wound with prepared chalk, iodoform, and petroleum, and saturates the system with lime water, iron, and arsenic.

(*b*) **Surgical Therapy.**—If the wound is recent and bleeding, the severed bloodvessel or vessels should be picked up, twisted with artery forceps, or, if large, ligatured. All blood-clot is then removed, for it must be remembered coagulated blood is an excellent medium for bacterial growth. If the tissues are badly contused, it may be necessary to effect surgical removal of a certain portion when such a sacrifice is permissible. This method is better surgery than that of leaving dying material in a wound cavity which in time will slough, retarding healing, and occasionally endangering life through septic infection. When the wound has been neglected at the outset, is suppurating profusely, and has deep-seated pockets containing sloughs, the free use of the knife and curette, followed by allowance for easy drainage, is imperative. These measures completed, the cavity is treated with antiseptics, and if the edges of the wound are gaping, one or more sutures may be applied. In all cases of injury, when the possibility of the lodgment of foreign bodies is suspected, these must be sought for by digital exploration or by probing, and their removal effected.

If the wound is an old one and the edges indurated, these must be cut away or curetted before sutures are inserted. If after suturing a wound it takes on an unhealthy action, indicated by œdema of the surrounding tissues, the discharge of unhealthy pus, and perhaps constitutional disturbance, the sutures must be removed and the cavity freely flushed.

Sutures.—When a solution of continuity, accidental or surgical, exists in the soft structures of the body, to assist Nature in the healing process the surgeon brings these structures into close apposition by suturation. The material used is usually sterile silk, thread, catgut, kangaroo tendon, wire, etc. Many kinds of suture are used in practice, the variety depending largely upon the nature, extent, and position of the wound, and partly, perhaps, upon the selective preference of the operator. The following are the most common:

(1) Button suture, when the threads are passed through the eyes of buttons and tied; useful when there is liable to be undue strain placed upon the sutures, with the consequent risk of tissue cutting.

(2) Cobbler's suture is made with a thread armed with a needle at each end; one needle having been passed through the tissue from right to left, the other needle is inserted immediately above or below it, but in the opposite direction—*i.e.*, left to right. It is useful where complete ligation is required, as, for example, in umbilical hernia or in removing neoplasms.

(3) Continuous suture is, as the term implies, inserted at one end of the wound, and continued without interruption to the whole extent. The free ends are then tied together, or they may be tied to the first and last insertion respectively. As a rule, these sutures are not very practicable in comparative surgery.

(4) Figure-of-eight suture consists of passing a pin through the lips of the wound at its right angles, and a thread figure-of-eight fashion is passed over the ends of the pin. Several sutures, in dealing with large wounds, are here required. After the operation has been completed the sharp points should be removed by wire pliers.

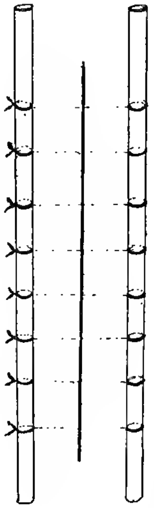

Fig. 194.—Quilled Suture.

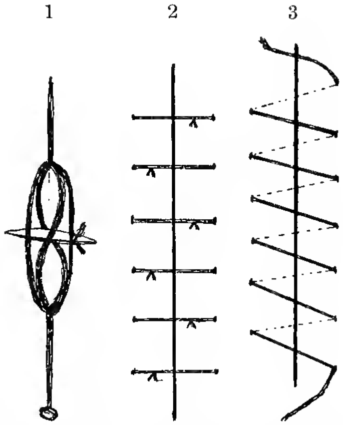

Fig. 195.—(1) Pin Suture; (2) Interrupted Suture; (3) Continuous Suture.

(5) Implanted sutures. Here a pin is passed through each lip of the wound parallel to the line of incision, the pins being then tied together by interrupted sutures. These sutures are serviceable when tension on the lips of the wound is present or expected.

(6) Interrupted sutures, as the term implies, consists of inserting each suture so that the one is quite independent of the other.

(7) Lembert suture is used in gastro-intestinal surgery, and consists of passing sutures (interrupted or continuous) in and out through the serous muscular and submucous coats on the one side of the wound, and repeated on the other side, thereby invaginating the lips of the wound and bringing the serous surfaces into close apposition.

(8) Quilled sutures are useful when there is considerable wound

tension, and consists of placing a quill of wood on either side of, and parallel with, the edges of the wound, each suture being tied over the quill.

(9) Relaxation suture is one so arranged that it can be relaxed when wound tension becomes excessive. These sutures are usually deeply inserted, and independent of the more superficial sutures, which are superadded.

Drainage.—In all wounds of a septic nature, drainage is of first importance. Stagnant serum in wound pockets facilitates bacterial growth before the leucocytes can reach the injured area in sufficient number to make their scavenging proclivities felt.

Further, when pus accumulates, its tryptic power brings about auto-digestion, which, in itself beneficial up to a point, can be distinctly harmful if allowed to go on indefinitely.

Some wounds are so situated that free drainage is maintained from the outset. These as a rule give the surgeon little trouble. When the wound entrance is higher than the distal blind end, drainage is impossible, except in the sense of an " overflow " which in itself carries little therapeutical value. In such a case the wound is probed to its *lowest point*, and a curved or semicurved needle armed with a tape is passed through the open wound down to the lowest pocket, and from there brought through the skin lower down. The tape itself may act as a drain, or it may be tied to a proper sterile rubber drainage tube, which is now drawn through the operation wound and fixed to the skin, or drainage may be effected by making a dependent opening. When one is dealing with wounds in the region of the poll, withers, croup, or loins, where by reason of the anatomical arrangement of the parts drainage is almost impossible, recourse is had to free, more or less continuous, irrigation, or packing with calcifying agents and gauze, which is renewed fairly often. In some instances tubes or tapes may be inserted, and by these drainage may be made satisfactory.

(*c*) **Biological Therapy.**—Given an ordinary bacterial wound infection, Nature possesses all the attributes necessary, not only to destroy bacteria and neutralize their toxins, but to repair and replace damaged and lost tissue. Should the bacteria belong to a very aggressive group, however, and Nature's defensive barriers break down one by one before the onslaught, a vicious circle becomes established, the bacteria run riot, and the life of the patient is endangered.

As we have already seen, a variety of reasons exists to account for Nature's failure in septic wound invasions; it therefore only now remains to discuss the best means at our disposal to fortify, stimulate, and when possible augment, Nature's protective forces.

In the case of a very acute septic infection such as is seen in anthrax, malignant œdema, black-quarter, tetanus, and other diseases of this type, it is imperative to obtain the early injection of immune sera if hopes of recovery are entertained, for it must be patent to anyone when the system has become charged to the full with bacteria or their toxins, or both, little prospect can be entertained for recovery.

On the other hand, when the wound infection belongs to a subacute or chronic type, vaccines are indicated with the object of whipping into activity the antibodies of the humoral elements. The invading bacteria are, as we have seen, very numerous, and no therapeutical gain would follow, for example, a vaccine obtained from staphylococci if administered in a streptococcal infection. Moreover, the majority of organisms possess many strains, beginning low down at the avirulent and ascending to the virulent types. It must be patent, therefore, that *stock* vaccines, if used, are somewhat empirical, and may even be quite useless. On the other hand, if a careful examination of the wound *materiès* is made, one becomes possessed of an important fact—*i.e.*, the type of organism or organisms present—and if from these an autogenous vaccine is used, the proper antibodies to fight the infection will become activated.

In chronic suppurating wounds, after an injection of vaccine, the discharge is usually increased for the first twenty-four to forty-eight hours, gradually subsiding with each subsequent dose.

Should recovery not follow in due course, there must be some reason, and this should be sought for.

As has been pointed out, in old-standing cases the walls may have become so indurated as to prevent the antibacterial serum and the phagocytes from reaching the infective foci, in which case the curette is indicated, or a slough may be present necessitating removal, or drainage may be defective, or the patient may be in such a low and debilitated condition that the body responses are defective, in which case rich food, healthy surroundings, and tonics are indicated. If after a course of vaccine recovery does not follow, there is no reason to despair; a further microscopical examination of the discharge should be made, for it is just possible, in the case of mixed infections, that another type of organism will be holding sway, or an additional bacterium to the original may now be present, or the doses of vaccine may not be large enough, or there may be some other error of technique requiring investigation.

Serum Application (*Direct*).—Of recent years antisera and even normal horse serum has been advocated for the dressing of infected wounds.

Gauze is soaked in the serum, which is passed deeply into the wound pockets, and repeated once or twice daily. The object of this method is to make up for a local deficiency in the wound in the shape of supplying a germ *destroying* serum in the case of the former, and a germ *preparing* serum principally in the case of the latter. By those who have had extensive experience of this method it is spoken of highly.

Donaldson's Method.—While working at a military hospital during the early years of the war Drs. Donaldson and Joyce, in the routine treatment of gunshot wounds by means of salt packs, noted the cases which made the best recoveries were those whose pus emitted a peculiar pungent smell. After a very careful investigation Donaldson found that this smell was due to an organism belonging to the anaerobic group and bearing a close relationship to the *B. sporogenes* (Metchnikoff). This organism he called the "Reading bacillus." It is a spore-bearing anaerobe possessing proteolytic properties which appear to have the power to break down—hydrolyze—the dead protein tissue associated with badly contused wounds. It will be readily conceded that this digesting power of devitalized, dying, or dead tissue in a wound cavity is an essential step towards the healing of such wounds, and bears a close relationship to the tryptic power possessed by ordinary pus, which has been already discussed.

The "Reading bacillus" does not appear to attack any tissue save that which is undergoing devitalizing changes; moreover, in the course of its growth and development, being non-pathogenic, it does not act adversely upon the surrounding healthy tissue. In addition to the disintegrating power it possesses towards sloughs, it is claimed that it also breaks up toxins present in wounds consequent upon pathogenic growth, an important point in those cases of septic intoxication. This function, it is presumed, is due to an enzyme or enzymes formed by the bacillus. Donaldson's own observation on this point is: "It may be regarded as a permanent manufactory of a proteoclastic enzyme whose initial velocity will be more or less maintained throughout, owing to constant removal by the wound discharges of the products of its hydrolysis."

The organism, being an anaerobe, can only grow when oxygen is excluded, and the author of this method concludes the salt pack acted mechanically—namely, that of a plug—for he ascertained the same beneficial results followed packing the wound with sphagnum moss. The technique he adopts is as follows: The wound is irrigated with normal saline solution, and all pockets dried as far as possible. With a pipette living cultures of the "Reading bacillus" are sown in the deep recesses of the wound, which is then packed with sphagnum moss lightly moistened with sterile water or saline solution. Several layers of plain sterile gauze moistened in saline solution is laid over the wound, then a thick layer of cotton-wool, the whole being firmly bandaged. Proof that the "Reading bacilli" are actively germinating is to be found in the fact that the discharge gives off a characteristic penetrating odour, while absence of this indicates an error of technique. The period of time the packs are left *in situ* varies from six to nine days, after which the wound is irrigated daily with eusol and then packed with gauze saturated in the same solution.

X RAYS.

The application of X rays in human medicine and surgery has been reduced to a fine art, both as a diagnostic and therapeutic agent. In comparative medicine and surgery it is not employed as often as it might be, especially when the practitioner is dealing with valuable animals, but one must not overlook the fact that the use of the apparatus at present is somewhat expensive, while superadded to this is the difficulty of transit save in the case of small animals, which can be readily brought to a hospital. The writer has, however, overcome this difficulty somewhat by the use of a portable apparatus, and there is no doubt that in time these will become more plentiful and more accessible to the general practitioner.

As a means of diagnosis X rays are useful in locating and defining fractures and dislocations; foreign bodies in the throat, gullet, stomach, and intestines; also calculi in the gall-bladder and duct, in the intestines, and in the urinary system; consolidated areas in the lungs, such as tubercular nodules, enlarged internal lymphatic glands, internal neoplasms (malignant and benign).

As a curative agent it covers a large field in human practice. In certain skin diseases it appears specially useful, particularly in obstinate cases of favus; in rodent ulcers, in lupus, in malignant neoplasms, and in certain internal growths, its use is coming to the fore.

YOKE GALL.

In recent cases, when the tissues are merely bruised, cold applications and lotions combined with rest to the parts may be prescribed.

If the skin is broken, antiseptic dressings are to be utilized. In severe cases, when suppuration and ulceration have occurred, surgical interference is required. Necrosed tissue must be removed and suppurative channels curetted, followed by suitable surgical dressings. Yokes should be adjusted to exert even pressure on the neck, and paddings should receive careful attention.—*G. K. Walker.*

APPENDIX

WEIGHTS AND MEASURES, WITH THEIR METRICAL EQUIVALENTS

Imperial System.

Measures of Mass (Weights).

1 Grain	(gr.)				
1 Ounce Avoir.	(oz.)			=	437·5 grains
1 Pound Avoir.	(lb.)	=	16 ounces	=	7000·0 ,,

Measures of Capacity (Volumes).

1 Minim	(min.)		
1 Fluid Dram	(fl. dr.)	=	60 minims
1 Fluid Ounce	(fl. oz.)	=	8 fluid drams
1 Pint	(O.)	=	20 fluid ounces

Weights and Measures of the Metric System.

Measures of Mass (Weights).

1 Milligram	(mg.)	=	the 1,000th part of 1 gram, or	0·001 g.
1 Centigram	(cg.)	=	the 100th ,, ,,	0·01 g.
1 Decigram	(dg.)	=	the 10th ,, ,,	0·1 g.
1 Gram	(g.)	=	the 1,000th part of the standard of international kilogram (kg.)	1·0 g.
1 Decagram		=	10 grams	10·0 g.
1 Hectogram		=	100 ,, ...	100·0 g.
1 Kilogram		=	1,000 ,, ...	1000·0 g.

Measures of Capacity (Volumes).

1 Centimil	(cl.)	=	the vol. at 4°	of	1 centigram	of water
1 Decimil	(dl.)	=	,,	,,	1 decigram	,,
1 Millilitre or Mil	(ml.)	=	,,	,,	1 gram	,,
1 Litre	(lit.)	=	,,	,,	1 kilogram	,,

Measures of Length.

1 Micron	(μ)	=	the 1,000th of 1 millimetre, or	0·001 mm.
1 Millimetre	(mm.)	=	the 1,000th part of 1 metre, or	0·001 m.
1 Centimetre	(cm.)	=	the 100th ,, ,,	0·01 m.
1 Decimetre	(dm.)	=	the 10th ,, ,,	0·1 m.
1 Metre	(m.)		.. ..	1·0 m.

Relations of Metric and Imperial Measures.

Mass.

1 Milligram (mg.) = 0·015 grain nearly
1 Centigram (cg.) = 0·154 ,, ,,
1 Decigram (dg.) = 1·543 ,, ,,
1 Gram (g.) = 15·4323564 grains
1 Kilogram (kg.) = 15432·3564 grains, or 35·274 ounces nearly, or 2·2046 pounds nearly

1 Grain (gr.) = 0·0648 gram nearly
1 Ounce Avoir. (oz.) = 28·35 grams ,,
1 Pound Avoir. (lb.) = 453·59 ,, ,,

Capacity.

1 Centimil (cl.) = 0·169 minim nearly
1 Decimil (dl) = 1·69 minims ,,
1 Millilitre or Mil (ml.) = 16·9 ,, ,,
1 Litre (lit.) = 1·7598 pints, or 35·196 fluid ounces nearly

1 Minim (min.) = 0·0592 mil nearly
1 Fluid Dram (fl. dr.) = 3·5515 mils ,,
1 Fluid Ounce (fl. oz.) = 28·4123 ,, ,,
1 Pint (O.) = 568·2454 mils nearly, or 0·5682 litre nearly

Length.

1 Micron (μ) = 0·00003937 inch
1 Millimetre (mm.) = 0·03937 ,,
1 Centimetre (cm.) = 0·3937 ,,
1 Decimetre (dm.) = 3·937 inches

1 Inch (in.) = 25·3999 millimetres

TABLE STATING DOSES (IMPERIAL AND METRIC).

Imperial.		*Metric.*
Grain		*Milligrams.*
$\frac{1}{200}$	=	0·3
$\frac{1}{100}$	=	0·6
$\frac{1}{64}$	=	1
$\frac{1}{40}$	=	1·5
$\frac{1}{32}$	=	2
$\frac{}{25}$	=	2·5
$\frac{1}{20}$	=	3
$\frac{1}{16}$	=	4
$\frac{1}{10}$	=	6
$\frac{1}{8}$	=	8
$\frac{1}{5}$	=	12
$\frac{1}{4}$	=	16
$\frac{1}{2}$	=	30
Grains.		*Centigrams.*
1	=	6
2	=	12
3	=	20
4	=	25
5	=	30
8	=	50
10	=	60

Imperial.		*Metric.*
Grains.		*Decigrams.*
3	=	2
5	=	3
8	=	5
10	=	6
15	=	10
20	=	12
30	=	20
60	=	40
Grains.		*Grams.*
15	=	1
30	=	2
45	=	3
60	=	4
120	=	8
150	=	10
180	=	12
240	=	16
480	=	32

Volumes.

Imperial.		*Metric.*
Minims.		*Centimils.*
$\frac{1}{2}$	=	3
1	=	6
2	=	12
3	=	18
5	=	30
8	=	50
Minims.		*Decimils.*
5	=	3
10	=	6
15	=	10
20	=	12
30	=	18
60	=	36

Imperial.		*Metric.*
Minims.		*Mils.*
15	=	1
30	=	2
45	=	3
60	=	4
90	=	6
Fluid Drams.		*Mils.*
$\frac{1}{2}$	=	2
1	=	4
2	=	8
6	=	24
Fluid Ounces.		*Mils.*
$\frac{1}{2}$	=	15
1	=	30
2	=	60
4	=	120

Relation of English to Metric Measures.

1	Minim	=	·059	millilitre or	5·9192	centimils
2	Minims	=	·118	,,	1·18384	decimils
3	,,	=	·178	,,	1·77576	,,
4	,,	=	·237	,,	2·36768	,,
5	,,	=	·296	,,	2·9596	,,
6	,,	=	·355	,,	3·55152	,,
7	,,	=	·414	,,	4·14344	,,
8	,,	=	·473	,,	4·73536	,,
9	,,	=	·533	,,	5·32728	,,
10	,,	=	·592	,,	5·9192	,,
11	,,	=	·651	,,	6·51112	,,
12	,,	=	·710	,,	7·10304	,,
13	,,	=	·769	,,	7·69496	,,
14	,,	=	·828	,,	8·28688	,,
15	,,	=	·888	,,	8·8788	,,
16	,,	=	·947	,,	9·47072	,,
17	,,	=	1·007	,,	or mils	
18	,,	=	1·066	,,	,,	
19	,,	=	1·125	,,	,,	
20	,,	=	1·184	,,	,,	
25	,,	=	1·480	,,	,,	
30	,,	=	1·776	,,	,,	
35	,,	=	2·072	,,	,,	
40	,,	=	2·368	,,	,,	
45	,,	=	2·664	,,	,,	
50	,,	=	2·960	,,	,,	
55	,,	=	3·256	,,	,,	
1	Fluid Dram	=	3·5515	,,	,,	
2	Fluid Drams	=	7·103	,,	,,	
3	,, ,,	=	10·654	,,	1·0654	centilitres
4	,, ,,	=	14·206	,,	1·4206	,,
5	,, ,,	=	17·757	,,	1·7757	,,
6	,, ,,	=	21·309	,,	2·1309	,,
7	,, ,,	=	24·860	,,	2·4860	,,
1	Fluid Ounce	=	28·412	,,	2·8412	,,
2	Fluid Ounces	=	56·824	,,	5·6824	,,
3	,, ,,	=	85·236	,,	8·5236	,,
4	,, ,,	=	113·649	,,	1·1364	decilitres
5	,, ,,	=	142·061	,,	1·4206	,,
10	,, ,,	=	284·122	,,	2·8412	,,
15	,, ,,	=	426·183	,,	4·2618	,,
20	,, ,,(1 pt.)	=	568·245	,,	0·56824	litre
40	,, ,,(1 qt.)	=	1136·49	,,	1·1364	litres

Relation of English to Metric Weights.

Grains.		*Gram.*			*Centigrams.*		*Milligrams.*
1	=	·0648	nearly	or	6·479	or	64·798
2	=	·1296	,,	,,	12·959	,,	129·597
3	=	·1944	,,	,,	19·439	,,	194·396
4	=	·2592	,,	,,	25·919	,,	259·195
5	=	·3240	,,	,,	32·399	,,	323·994
6	=	·3888	,,	,,	38·879	,,	388·793
7	=	·4536	,,	,,	45·359	,,	453·592
8	=	·5184	,,	,,	51·839	,,	518·391
9	=	·5832	,,	,,	58·319	,,	583·190
10	=	·6480	,,	,,	64·798	,,	647·989
11	=	·7128	,,	,,	71·278	,,	712·788
12	=	·7776	,,	,,	77·758	,,	777·587
13	=	·8424	,,	,,	84·238	,,	842·385
14	=	·9072	,,	,,	90·718	,,	907·184
15	=	·9720	,,	,,	97·198	,,	971·983
15·432	=	1·0	,,	,,	100·0	,,	1000·0

		Grams.		*Centigrams.*		*Milligrams.*
1 Scruple (20 grains)	=	1·2959	or	129·59	or	1295·97
2 Scruples (40 grains)	=	2·5915	,,	259·19	,,	2591·95
3 Scruples or 1 Dram	=	3·8879	,,	388·79	,,	3887·93
1 Ounce (Troy)	=	31·1034	,,	3110·34		

Ounces (Av.)		*Grains.*		*Grams.*		*Centigrams.*
¼	or	109·375	=	7·087375	or	708·7375
½	,,	218·75	=	14·17476	,,	1417·476
1	,,	437·5	=	28·34953	,,	2834·953
2	,,	875	=	56·699	,,	5669·9
3	,,	1312·5	=	85·0486	,,	8504·86
4	,,	1750	=	113·3981	,,	11339·81
5	,,	2187·5	=	141·7477	,,	14174·77
6	,,	2625	=	170·097	,,	17009·7
7	,,	3062·5	=	198·4466	,,	19844·66
8	,,	3500	=	226·7962	,,	22679·62
9	,,	3937·5	=	255·1458	,,	25514·58
10	,,	4375	=	283·495	,,	28349·5
11	,,	4812·5	=	311·8449	,,	31184·49
12	,,	5250	=	340·1943	,,	34019·43
13	,,	5687·5	=	368·5439	,,	36854·39
14	,,	6125	=	396·8933	,,	39689·33
15	,,	6562·5	=	425·243	,,	42524·3
16 (1 lb.)	,,	7000	=	453·59243	,,	45359·243

Relation of Metric to English Weights.

1	Milligram, or ·001 gram		=			$\frac{1}{64}$	grain	nearly
1	Centigram, or ·01 ,,		=			$\frac{2}{13}$	,,	,,
1	Decigram, or ·1 ,,		=			$1\frac{1}{2}$	grains	,,
1	Gram		=			$15\frac{1}{2}$	,,	,,
5	Grams		=			$77\frac{1}{6}$	,,	,,
10	,,	(1 decagram)	=			$154\frac{1}{3}$	,,	,,
20	,,		=			$308\frac{2}{3}$	,,	,,
30	,,		=	1	ounce	$25\frac{1}{2}$	,,	,,
40	,,		=	1	,,	$179\frac{3}{4}$	,,	,,
50	,,		=	1	,,	334	,,	,,
60	,,		=	2	ounces	51	,,	,,
70	,,		=	2	,,	$205\frac{1}{4}$	,,	,,
80	,,		=	2	,,	$359\frac{1}{2}$	,,	,,
90	,,		=	3	,,	$76\frac{1}{3}$	,,	,,
100	,,	(1 hectogram)	=	3	,,	$230\frac{3}{4}$	,,	,,
200	,,		=	7	,,	24	,,	,,
300	,,		=	10	,,	$254\frac{3}{4}$	,,	,,
400	,,		=	14	,,	48	,,	,,
500	,,		=	17	,,	$278\frac{1}{2}$	,,	,,
600	,,		=	21	,,	$71\frac{3}{4}$	,,	,,
700	,,		=	24	,,	$302\frac{1}{2}$	,,	,,
800	,,		=	28	,,	96	,,	,,
900	,,		=	31	,,	$326\frac{1}{3}$	,,	,,
1,000	,,	(1 kilogram)	=	35	,,	120	,,	,,

Relation of Metric to English Measures.

1	Millilitre (1 mil)		=			16·95	minims	nearly
2	Millilitres		=			33·9	,,	,,
3	,,		=			50·8	,,	,,
4	,,		=		1 dr.	7·61	,,	,,
5	,,		=		1 dr.	24·5	,,	,,
6	,,		=		1 dr.	41·41	,,	,,
7	,,		=		1 dr.	58·32	,,	,,
8	,,		=		2 drs.	15·22	,,	,,
9	,,		=		2 drs.	32·5	,,	,,
10	,,		=		2 drs.	48·9	,,	,,
15	,,		=		4 drs.	13·4	,,	,,
20	,,		=		5 drs.	37·8	,,	,,
25	,,		=		7 drs.	2·4	,,	,,
30	,,		=	1 oz.	0 dr.	26·8	,,	,,
40	,,		=	1 oz.	3 drs.	15·7	,,	,,
50	,,		=	1 oz.	6 drs.	4·7	,,	,,
75	,,		=	2 oz.	5 drs.	7·1	,,	,,
100	,,		=	3 oz.	4 drs.	9·4	,,	,,
500	,,		=	17 oz.	4 drs.	47	,,	,,
1,000	,,	(1 litre)	=	35 oz.	1 dr.	34	,,	,,

Relation of Fahrenheit to Centigrade Degrees.

32° F.	=	0° C.	100·5° F.	=	38·05° C.
50° F.	=	10° C.	101° F.	=	38·33° C.
60° F.	=	15·5° C.	101·5° F.	=	38·61° C.
70° F.	=	21·11° C.	102° F.	=	38·88° C.
80° F.	=	26·66° C.	102·5° F.	=	39·16° C.
90° F.	=	32·22° C.	103° F.	=	39·44° C.
95° F.	=	35° C.	103·5° F.	=	39·72° C.
95·5° F.	=	35·27° C.	104° F.	=	40° C.
96° F.	=	35·55° C.	104·5° F.	=	40·27° C.
96·5° F.	=	35·83° C.	105° F.	=	40·55° C.
97° F.	=	36·11° C.	105·5° F.	=	40·83° C.
97·5° F.	=	36·38° C.	106° F.	=	41·11° C.
98° F.	=	36·66° C.	106·5° F.	=	41·38° C.
98·5° F.	=	36·94° C.	107° F.	=	41·66° C.
99° F.	=	37·22° C.	108° F.	=	42·22° C.
99·5° F.	=	37·5° C.	110° F.	=	43·33° C.
100° F.	=	37·77° C.	120° F.	=	48·88° C.

Relation of Centigrade to Fahrenheit Degrees.

1° C.	=	33·8° F.	26° C.	=	78·8° F.
2° C.	=	35·6° F.	27° C.	=	80·6° F.
3° C.	=	37·4° F.	28° C.	=	82·4° F.
4° C.	=	39·2° F.	29° C.	=	84·2° F.
5° C.	=	41° F.	30° C.	=	86° F.
6° C.	=	42·8° F.	31° C.	=	87·8° F.
7° C.	=	44·6° F.	32° C.	=	89·6° F.
8° C.	=	46·4° F.	33° C.	=	91·4° F.
9° C.	=	48·2° F.	34° C.	=	93·2° F.
10° C.	=	50° F.	35° C.	=	95° F.
11° C.	=	51·8° F.	36° C.	=	96·8° F.
12° C.	=	53·6° F.	37° C.	=	98·6° F.
13° C.	=	55·4° F.	38° C.	=	100·4° F.
14° C.	=	57·2° F.	39° C.	=	102·2° F.
15° C.	=	59° F.	40° C.	=	104° F.
16° C.	=	60·8° F.	41° C.	=	105·8° F.
17° C.	=	62·6° F.	42° C.	=	107·6° F.
18° C.	=	64·4° F.	43° C.	=	109·4° F.
19° C.	=	66·2° F.	44° C.	=	111·2° F.
20° C.	=	68° F.	45° C.	=	113° F.
21° C.	=	69·8° F.	46° C.	=	114·8° F.
22° C.	=	71·6° F.	47° C.	=	116·6° F.
23° C.	=	73·4° F.	48° C.	=	118·4° F.
24° C.	=	75·2° F.	49° C.	=	120·2° F.
25° C.	=	77° F.	50° C.	=	122° F.

INDEX

A

- ABDOMINAL parietes wounds, 1
- Abomasitis, 2
- Abortion, 3
  - epizootic, 3
  - immunization, 4
  - sporadic, 3
- Abscess, 4
  - camel, 6,
    - feet, 8
    - frontal sinus, 8
    - glands, 7
    - pads, 6
    - saddle galls, etc., 7
    - testicles, 7
  - drainage, 5
  - specific, 6
- Acarina. *See* Parasitic Diseases, 379
- Achylia, 8
- Acidity, gastric. *See* Dyspepsia, 134
- Acne, 9
- Acorn poisoning. *See* Poisons, 434
- Actinobacillosis, 9
- Actinomycosis, 10
  - surgical methods, 12
  - vaccine therapy, 14
- Actual cautery (firing), 15
  - general remarks, 15
- Agalactia (absence of milk), 17
- Albuminuria, 17
- Alopecia, 18
- Alveolar periostitis, 18
- Amaurosis, 18
- Amputations, 19
  - claw (cattle and sheep), 19
  - limbs, 19
  - mammary gland, 281
  - penis, 21
  - uterus, 22
  - vagina, 23
- Anæmia, 23
  - dietetic, 23
  - digestive and nutritive, 23
  - eliminative, 23
  - infective, 24
  - specific treatment, 25
  - treatment, 24
- Anæsthesia (general), 26
  - corneal reflex in, 28
  - danger signals in, 30
- Anæsthesia (general)—*continued*
  - doses for cat, cattle, dog, foal, goat, horse, pig, sheep, 28
  - pulse in, 28
  - respiration, 28
  - standing, 30
- Anæsthesia (local), 30
  - freezing, 31
  - infiltration, 31
  - local application, 30
- Anaphylaxis, 31
- Anasarca, 32
- Angina pectoris, 32
- Ankylosis, 32
- Anthrax, 32
  - camel, 33
    - curative treatment, 33
    - disposal of carcasses, 33
    - preventive treatment, 33
    - segregation, 34
    - source of infection, 33
    - vaccine and serum inoculation, 34
- Anus, diseases of, 34
  - anal atresia, 34
    - fistula, 34
    - pouches, impaction of, 35
- Aphtha contagiosa. *See* Foot and Mouth Disease, 184
- Aphthous stomatitis, 35
- Apoplexy, 35
- Arthritis, 36
  - rheumatoid, 37, 470, 471
  - traumatic, 36
- Artificial eye, 38
- Ascarides. *See* Parasitic Diseases, 354
- Ascites, 38
- Aspergillosis, 39
- Asthma (bronchial), 39
  - dog, 39
  - horse, 39
- Atresia ani et recti. *See* Diseases of Anus, 34
- Auricular acariasis (otacariasis), 40, 399, 400, 402
- Avian diseases, 40
  - apoplectiform septicæmia in chicks, 40
  - asthenia, 40
  - bronchitis, 40

Avian diseases—*continued*
- cholera, 41
- constipation, 41
- crop diseases, 41
  - catarrh and inflammation of mucosæ, 41
  - indigestion, 41
- diphtheria, 41
- fowl pox, 42
- gapes, 42, 366
- gastro-intestinal catarrh, 43
- nasal catarrh, simple, 43
  - specific (roup), 43
- pneumonia, 43
- stomatitis, catarrhal, 43
  - parasitic, 43
- turkey entero-hepatitis, infective, 43

Azoturia, 43

B

Balanitis, 44
Bandages, 45
Bedsores, 46
Bee sting, 47
Bier's treatment (hyperæmia), 47
- dry cupping, 47
- elastic compression, 47
- heated air, 47

Bile duct, catarrh of, 48
Bilharziosis vel schistosomiasis, 49
Biliousness, 49
Black-quarter, 49
Bladder, diseases of, 50
- atony, 50
- distension, 50
- hæmorrhage, 51
- inflammation, 51
- inversion, 53
- irritability, 53
- sabulous deposits, 53

Bleeding. *See* Hæmorrhage, 216
Blistering, 54. *See also* Vesication, 590
Blood-letting, 54
Blood poisoning. *See* Septicæmia, 490
Blood spavin, 55
Bloody flux. *See* Dysentery, 132-133
Blown. *See* Tympany of the Rumen, 481-482
Blue tick. *See* Ticks, Control of, 553
Blue tongue, or catarrhal fever of sheep (South Africa), 55
Bog spavin, 57
Bone, diseases of, 58
- necrosis, 58
- periostitis, 59
- rachitis, 59

Bone spavin, 60
Botryomycosis, 61
Bradycardia, 62
Brain, diseases of, 62
- concussion, 62
- congestion, 62
- encephalitis, 165
- hæmorrhage. *See* Apoplexy, 35
- inflammation, 62

Braxy, 63
Bright's disease. *See* Albuminuria, 17
Broken knees, 63
Broken wind. *See* Emphysema, Pulmonary, 163
Bronchial asthma. *See* Asthma, 39
Bronchiectasis, 65
Bronchitis (acute), 65
Bronchitis (chronic), 67
- chemotherapy, 67

Bronchocele. *See* Goitre, 209
Broncho-pneumonia. *See* Pneumonia, 430
Bruises, 67
Brushing, 68
Bull burnt. *See* Vaginitis, Vesicular, 588
Burns and scalds, 68
Bursatee (parasitic granulomata, granular dermatitis), 69
Bursitis, or bursal enlargement, 69

C

Cæcum, impaction, 70
Cæsarean section, 70
Calculi, 72
- biliary, 72
- intestinal, 72
- salivary, 72
- urethral, 73
- vesical, 74

Camel pox, 75
Canadian horse pox, 77
Cancer, 77
- general treatment of, 77
- of the horn, 78
- of the penis, 78
- special treatment of, 77

Canker (dog's ear), 78
Canker (horse's foot), 79
Capped elbow, 80
Capped hock, 81
Castration, 81
- actual cautery, 84
- crushing, 84
- torsion, 83

Cataract, 85
Catarrh (malignant), 88
Catarrh (simple), 86
- bronchial, 86
- gastro-intestinal, 87
- laryngo-pharyngeal, 87
- nasal, 87

Catheterization, 89
  bovine (male), 90
  canine (male), 90
    (female), 90
  cow, 90
  feline (male), 90
    (female), 90
  horse, 89
  mare, 90
  ovine, 90
Cellulitis, epizootic. *See* Influenza, 235
Choking, 91
Chorea, 94
Chylous ascites. *See* Ascites, 38
Cirrhosis of the liver, 95
Clitoridectomy. *See* Nymphomania, 327-328
Coccidiosis, 95, 349, 350, 357
Cœnurosis, 95, 370, 371
Colic, camel, 98
  horse, 96
Collapse and surgical shock, 99
Colon, impaction of the, 100
Coma, 101
Congestion, acute pulmonary, 101
Conjunctivitis, 102
Constipation, 102
  in camel, 103
  in dog, 102
  in horse, 102
Contagious catarrh, or influenza, 103
Convulsions in dog, horse, and ox, 140
Corneal ulcer, 105
Corns, 105
Cough, 105
Cow pox. *See* Variola, 588
Cracked heels in horses, 106
Cramp, muscular, 106
Cretinism, 106
Crib-biting, 107
Cryptorchidism, 107
Curb, 110
Cystic calculi. *See* Calculi, 74
Cysticerci (pig), 111, 371
Cystitis. *See* Bladder Diseases, 51

D

Dandruff, 111
Debility, 111
Dengue (three days' sickness), 111
Dental caries, 111
Dentigerous cysts, 112
Dentition, disorders of, 112
Dermatitis, 113
  bullous, 113
  erysipelatous, 113
  pustular, contagious. *See* Acne, 9
Dew claws, removal of, 113
Diabetes, 113
  insipidus, 113
Diabetes—*continued*
  mellitus, 114
    diet, 114
    drug therapy, 114
Diarrhœa, 115
  acute, in calves and dogs, 116
    in foals, horse, and ox, 115
  chronic, in horse and ox, 116
  diet in dog, 118
    in horse and ox, 117
  in camel, 118
  specific, in calves. *See* White Scour, 596
Dilatation of the heart, 118
Discomycosis. *See* Botryomycosis, 61
Dislocations, 119
  fetlock, 120
  hip, 120
  lower jaw, 119
  neck, 119, 129
  patella, 121
  shoulder, 120
Distemper, canine, 121
  biological treatment in, 126
  chemical treatment in, 122
  curative treatment in, 122
  management and diet in, 126
  prophylactic treatment in, 122
Distomiasis, 127, 367-368
  curative treatment in, 128
  prophylactic treatment in, 127
Distortion (neck), 119, 129
Docking, 129
Dourine, 130
Dropped elbow, 130
Dropping of the cud, 130
Dropsy, 130
  abdomen, 130
  amnion, 131
  chest, 131
  limbs, 132
  pericardium, 132
Dysentery in camel, 133
  in dog and ox, 132
Dyspepsia, 134
  acid, in dog and horse, 134
  antacid, in dog and horse, 134
  atonic, in dog and horse, 134-135
  in foals and calves, 135
      diet, 136
      drug treatment in, 136
Dystocia, 137
  antiseptics in parturition, 156
  embryotomy in, 153
    fœtal, 140
      emphysema, 143
    hydrocephalus, 141
    monstrosities, 143
  fore limb amputation, 153
  hind limb amputation, 154

Dystocia—*continued*
    malpresentations in, 144
        abdominal, 152
        anterior, 145
        breech, 149
        lumbo-sacral, 152
        posterior, 149-151
    maternal, 137
        labour deficiency, 137
        pelvic irregularities, 137
        scirrhous os uteri, 138
        torsion, uterine, 137
Dysuria, 156

E

East Coast fever, 157
Eclampsia, 158
Ectropion, 159
Eczema, treatment by drugs and vaccines, 159
Effusion, 161
Elephantiasis, 161
Emaciation, 162
Embolism, 162
Embryotomy. *See* Dystocia, 153
Emphysema, 162
    pulmonary, 162
    subcutaneous, 163
Empyema, 164
    operation for, 164
Encephalitis, 165
Endocarditis, 165
Endometritis, drug, serum, and vaccine treatment, 165
Enteritis, 167
Entropium, 169
Epididymitis, 170
Epilepsy, 170
Epileptiform fits, 171
Epistaxis, local and general treatment, 171
Epizootic cellulitis. *See* Influenza, 235
Epulis, 171
Erysipelas, drug and autovaccine treatment, 171
Erythema, 172
Exophthalmia. *See* Goitre, 209
Exostosis, 173

F

Fainting, 173
False quarter, 173
Farcy. *See* Glanders, 208
Feeding, artificial, 174
Fevers, general and special treatment, 175
Filaria. *See* Parasitic Diseases, 352
Fistula, 176
    anus, 180
Fistula—*continued*
    bowel, 181
    cheek, 182
    croup, 180
    mammary, 183
    œsophagus, 181
    parotid, 182
    pharynx, 181
    poll, 176
    rectum, 181
    sternum, 179
    withers, 178
Fleas, 184, 409
Fluke. *See* Parasites, 368
Flux. *See* Dysentery, 132
Follicular mange. *See* Demodectic Mange, 379
Foot and mouth disease, 184
Foot rot, sheep, 184
Foreign bodies, 184
        in bowels, 185
        in eye, 185
        in mouth, 186
        in œsophagus, 185
        in pharynx, 185
        in rumen, 186
        in subcutaneous tissue, 186
Foul. *See* Whitlow, 597
Fractures, 187
    of cervical vertebræ, 189
    of coccygeal vertebræ, 189
    of cranial bones, 189
    of femur, 191
    of first and second phalanges, 193
    of frontal bones, 192
    of humerus, 192
    of inferior mandible, 192
    of lumbar vertebræ, 190
    of nasal bones, 192
    of patella, 194
    of pelvis, 196
    of radius, 195
    of ribs, 195
    of sacrum, 196
    of scapula, 196
    of thoracic vertebræ, 190
    of tibia, 197

G

Gall-bladder, inflammation of, 198
Galls (collar and saddle), 198
Gall-sickness (Galziekte), 200
Gall-stones. *See* Calculi, 72
Gangrene, 201
    dry, 201
    moist, 201
    traumatic, 201
Garget. *See* Mastitis, 278

Gastrectasis, 202
Gastric catarrh. *See* Dyspepsia, 134
Gastric impaction, 202
Gastric tympany, 203
Gastritis, 204
Gastro-enteritis, 205
Gastrophilus equi, 206, 410
Gastrostaxis, 207
Gathered nails, 207
Gillar (parasitic anæmia), 208
Glanders, 208
Glaucoma, 208
Glossitis, 209
Glossoplegia, 209
Goitre, 209
Gonitis, 210
Grease, 211
Gut tie. *See* Hernia, pelvic, 223
Guttural pouch, disease of, 212

H

Hæmatemesis, 214
Hæmatoma, 214
Hæmaturia, 215
Hæmophilia, 216
Hæmorrhage, 216
Hæmorrhagic septicæmia, 217
Hæmorrhoids, 217
Hæmothorax, 218
Hair and wool balls, 218
Heart, diseases of, 219
    dilatation, 219
    fatty, 220
    general management, 219
    hypertrophy of, 220
    palpitation of, 220
    valvular diseases of, 219
Heart-water, 220
Hemiplegia, 221
Hepatitis. *See* Liver Diseases, 268
Hernia, 221
    inguinal, 221
    pelvic, 223
    scrotal, 222
    umbilical, 224
    ventral, 225
Herpes, 226
Hoose. *See* Parasitic Diseases, 360
Horse pox. *See* Variola Equina, 588
Hydrocele, 226
Hydrocephalus. *See* Brain, Diseases of, 62
Hydrotherapy, 227
Hydrothorax. *See* Dropsy, Chest, 131
Hygroma, 228
Hymen, impervious, 229
Hysterectomy, 230

I

Icterus, 230
Impaction, 231
    of cæcum and colon, 231
    of omasum, 232
    of rectum, 233
    of rumen, 233
    of stomach, 233
Impotence, 234
Indigestion. *See* Dyspepsia, 134
Inertia, uterine, 234
Inflammation, 234
    local, 235
    systemic, 234
Influenza, 235
    drug therapy, 236
    prophylaxis, 237
    sero-vaccine therapy, 238
Inhalations, 238
Injections, 239
    hypodermoclysis, 239
    intracranial, 240
    intramammary, 239
    intraperitoneal, 240
    intraspinal, 240
    intratracheal, 239
    intravenous, 239
    proctolysis, 240
Interdigital cysts (dog), 240
Interdigital fibroma (cattle), 240
Intestinal disorders, 241
    atony, 241
    congestion, 241
    indigestion in camel, dog, horse, ox, pig, and sheep, 242
    intussusception and volvulus, 242
Iritis, 243
Irrigation, 243
    bladder, 243
    bowels, 244
    stomach, 244

J

Jaundice. *See* Icterus, 230
Jhooling, camel, 244
Johne's disease, 247
Joint evil, 251

K

Kamri, 251
Keratitis. *See* Conjunctivitis, 102
Keratoma, 252
Kicking, 252
Kidney, diseases of, 253
    calculi, 253
    congestion, 253
    inflammation, 253
Knuckling over, 254

L

Labour, artificial, 255
  operation for, 255
Lachrymal gland cum duct, diseases of, 256
  dacryo-adenitis, 256
  dacryo-cystitis, 256
  stenosis of, 256
Laminitis, 256
Lampas, 258
Lamziekte, or loin disease, 259
Laparotomy, 260
Larynx, diseases of, 261
  catarrh, 261
  croup, 262
  œdema, 262
  spasm, 262
  tumours, 262
Leucæmia, 263
Leucoma. *See* Opacity, Corneal
Leucorrhœa, 263
  drug therapy, 264
  vaccine therapy, 265
Lice. *See* Parasites, 405
Lightning stroke, 265
Lips, diseases of, 266
  cheilitis, 266
  epithelioma, 266
  paralysis, 266
  warts, 266
Lithotomy. *See* Calculi, 74
Liver, diseases of, 267
  abscess, 267
  actinomycosis, 267
  biliousness, 49
  cirrhosis, 267
  coccidiosis. *See* Parasites, 349
  congestion, 267
  cysticercosis. *See* Parasites, 371
  distomatosis. *See* Parasites, 368
  echinococcosis. *See* Parasites, 372
  icterus, 230
  inflammation, 268. *See also* Congestion
  rupture, 268
Local anæsthesia. *See* Anæsthesia, 30
Lockjaw. *See* Tetanus, 547
Lumbar puncture, 268
Lymphatic system, diseases of, 269
  lymphadenitis, 269
  lymphadenoma, 270
  lymphangiectasis, 270
  lymphangitis epizootica, 270
    simple, 270

M

Maggots, sheep, 271
Malignant aphtha, sheep, 272
Malignant catarrh. *See* Catarrh, 88
Malignant jaundice, 272, 348
Malignant œdema, 272
Mallanders and sallanders, 271
Mallein, 273
  intradermo-palpebral test, 275
  ophthalmic test, 275
  subcutaneous test, 273
Malnutrition, 275
Mammary gland, diseases of, 277
  congestion, 277
  cysts, 277
  mastitis, 278
    amputation in, 281
    auto-vaccination in, 282
    constitutional treatment in, 278
    local treatment in, 279
    prevention in, 284
    prophylaxis in, 284
  stenosis of mammary duct, 285
  tumours, 286
  warts, 287
Mane and tail eczema, 287
Mange. *See* Parasites, Acarina, 379
Massage, 288
  effleurage, 288
  friction, 288
  general massage, 288
  pétrissage, 288
  tapotement, 288
  vibration, 288
Masticatory paralysis, 289
Medicinal agents, 290
  acacia, adrenalin, aloes, alum, ammonia, 290
  amyl nitrate, anisi fructus, antifebrin, antimonium, antipyrine, aphrodine, apomorphia, aquæ, 291
  arsenic, atoxyl, atropine, 292
  belladonna, beta-naphthol, 292
  bismuth, boric acid, bromides, 293
  caffeine, calcium, camphor, 293
  cannabis indica, cantharides, carbolic acid, carron oil, cascara sagrada, 294
  castor oil, catechu, chenopodium (oil of), chinosol, chloral hydrate, chloretone, chlorine (Dakin's solution, eusol), 295
  chloroform, cinchona, cinnamon, citric acid, cocaine, cod-liver oil, colchicum, copper sulphate, creosote, 296
  croton oil, 297
  damiana, digitalis, 297
  ergot, eserine, ether, eucaine, eucalyptus, 297
  fibrolysin, 297
  flavine (acri- and proflavine), formalin, 298

Medicinal agents—*continued*
  gentian, glycerophosphates, guaiacol, guaiacum, 298
  heroin, hexamin, hydrochloric acid, hydrocyanic acid, hydrogen peroxide, 298
  hyoscyamus, 299
  ichthyol, iodides, iodine, iodoform, ipecacuanha, iron, 299
  jalap, 299
  juniper, 300
  lead, lecithin, linseed oil, lithia, Lysol, 300
  magnesia, malt extract, mercury, 300
  morphia, mustard, 301
  nitric acid, nitrohydrochloric acid, novocaine, nux vomica, 301
  olive oil, opium, 301
  papain, paraffin, paraldehyde, peppermint, pepsin, peptonized milk, permanganate of potash, phosphatis, phosphorus, pilocarpine, potassium, 302
  poultices, 303
  quassia, quinine, 303
  resorcin, rhubarb, 303
  salicylates, 303
  santonin, senna, silver, sodium, stramonium, strophanthus, 304
  strychnine, sulphocarbolates, sulphur, sulphuric acid, 305
  tannin, tar, thymol, turpentine, 305
  valerian, veratrine, 306
  zinc, 306
Megrims, 306
Meibomian gland, disease of, 307
Membrana nictitans, 307
Meningitis. *See* Brain, Diseases of, 62
Metritis, 308
  drug therapy, 308
  prophylaxis, 310
  vaccine therapy, 309
Milk, abnormalities of, 310
  bitter, blue, clotted, treatment for, 310
  red, treatment for, 311
Milk fever, 311
  curative treatment, 311
  prophylactic treatment, 312
Mud fever, 312
Mycosis, 313
Myelitis, 313

N

Nasal catarrh. *See* Catarrh, Nasal, 87
Nasal neoplasms, 314
Navicular disease, 315
Necrobacillosis, 316
Nephritis. *See* Kidney Diseases, 253
Nettlerash, 316
Neuralgia, 317
Neurasthenia, 317
Neurectomies, 318
  median, 318
  peroneal, 323
  plantar, higher and lower, 319
Neuritis, 324
Neuromata, 324
N'gana, 324
Normal saline solution, 326
  intrarectal, 327
  intravenous, 327
  subcutaneous, 326
Nymphomania, 327

O

Obesity, 328
Œdema. *See* Anasarca, 32
Œsophagotomy, 328
Œsophagus, diseases of, 330
  constriction, 330
  dilatation, 331
  obstruction. *See* Choking, 91
  œsophagitis, 331
  paralysis, 331
  spasm, 331
Offspring, attention to, 332
Omasum, diseases of, 332
  inflammation, 332
  impaction, 333
Opacity, corneal, 333
Ophthalmia, periodic, 333
Ophthalmia, simple, 334
Orchitis, 334
Organotherapy, 334
  ovary and testis, extract of, 335
  pituitary, extract of, 335
  suprarenal, extract of, 335
  thymus, extract of, 335
  thyroid, extract of, 335
Osteomalacia, 336
Osteoporosis, 336
Ostitis. *See* Bone Diseases, 58
Otitis, 336
Ovaries, diseases of, 337
  oöphoritis, 337
  ovarian cyst, 337
Ovariotomy, 337
Oxygen, uses of, 340

P

Pain, 340
Paracentesis, 341
  abdominal, 341
  pericardial, 342
  thoracic, 342

- Paralysis of nerves, 342
  - auditory, 342
  - facial, 342
  - femoral, 343
  - hypoglossal, 343
  - obturator, 343
  - optic, 343
  - pharyngeal, 343
  - pudendal, 344
  - radial, 344
- Paraphymosis, 344
- Paraplegia, 344
- Parasitic diseases, 345
  - acanthocephala, 366
  - acarina, 379
    - accidental infestations with mites, 402
    - chorioptic mange of the horse, 400
    - cnemidocoptic scabies, poultry, 395
    - depluming scabies, fowl, 396
    - demodectic mange, 379
      - of dog, goat, horse, ox, pig, 380
    - infestations by ticks, 403
    - mange, remarks on general treatment, 383
      - on prevention, 384
      - on prophylaxis, 384
    - notœdric mange of the cat, rabbit, 395
    - otodectic mange of cat, dog, ferret, 402
    - polyinfections of scabies, 402
    - psoroptic mange, horse, 396
      - otacariasis, goat, 399
        - rabbit, 400
      - scabies, ox, 399
        - sheep, 397
    - sarcoptic mange, 386
      - camel, 391
      - dog, 390
      - ferret, 390
      - goat, 390
      - horse, 386
      - ox, 389
      - pig, 389
      - sheep, 390
  - annelida, 378
  - cestoda, 370
    - cœnurosis, 370
      - rabbit, 370
      - sheep, 370
    - cysticercosis, 371
    - echinococcosis, 372
    - tæniasis, 373
      - birds, 378
      - cat, 378
      - dog, 375

- Parasitic diseases, cestoda—*continued*
    - tæniasis, goat, 374
      - horse, 373
      - ox, 374
      - pig, 374
      - sheep, 374
  - insecta, 405
    - blood-sucking flies, 414
    - bots, 410
    - bugs, 409
    - fleas, 409
    - insect stings, 410
    - jiggers, 410
    - lousiness, 405
      - cattle, 407
      - dog, 408
      - horse, 408
      - poultry, 408
      - sheep, 407
      - swine, 407
    - myiasis, 414
    - sheep maggot fly, 413
      - nostril fly, 413
    - warbles, 412
  - linguatulida, 379
    - parasitic rhinitis, 379
  - nematoda, 352
    - ankylostomiasis, 353
    - ascariasis, 354
      - cat, 356
      - dog, 355
      - horse, 354
      - pig, 355
    - equine strongylidiosis, 357
      - treatment, 358
      - prevention, 359
      - prophylaxis, 358
    - habronemiasis, 359
    - heterakiasis, 359
    - hook-worm disease of ruminants, 360
    - husk hoose, 360
    - œsophagostomiasis, 362
    - oxyuriosis, 363
    - parasitic gastro-enteritis, 364
    - syngamosis, 366
  - protozoa, 347
    - babesiosis (piroplasmosis), 346, 422
    - British redwater, 346
    - coccidiosis, 349
      - of birds, 351
      - of cattle, 349
      - of goats, 350
      - of hares, 350
      - of lambs, 350
      - of rabbits, 350
    - East Coast fever (Rhodesian redwater), 348
    - equine malaria, 348

Parasitic diseases, protozoa—*continued*
    malignant jaundice, 348
    ovine piroplasmosis, 348
    sarcosporidiosis, 352
    trypanosomiasis, 352
  trematoda, 367
    horse, 367
    ox, 367
    sheep (distomatosis, liver rot), 368
Parotitis, 416
Patella, luxation of. *See also* Dislocations, 121
Pericarditis, 417
Peritonitis, acute, 417
Peritonitis, chronic, 418
Pharyngitis, 418
Phlebitis, 420
Phlebotomy. *See* Blood-letting, 54
Phymosis, 421
Pica, 421
Pink eye. *See* Influenza, 235
Piroplasmosis, 346, 422
  bovine, 424
  canine, 425
  equine, 426
Pityriasis, 426
Placenta, retention of, 427
Plethora. *See* Obesity, 328
Pleuritis, 429
  acute, 429
  chronic, 429
Pleurodynia, 430
Pneumonia, 430
  diet in, 432
  drug therapy, 430
  hygiene, 432
  lung puncture, 431
  sero-vaccine therapy, 431
Pneumothorax, 433
Poisoning and poisons, 433
  by acorns, 434
  by alcohol, aloes, alsike clover, ammonia, antimony, 435
  by arsenic, barium chloride, beechnut oil cakes, belladonna, box leaves, bracken, 436
  by brine, bromides, buttercup, 437
  by butter of antimony, caffeine, cantharides, carbolic acid, carbon monoxide, castor oil, chloroform, colchicum, conium, 438
  by copper, corrosive sublimate, creasote, 439
  by croton, cruciferæ, darnel grass, 440
  by deadly nightshade (*see* belladonna), digitalis, 441
  by Epsom salts, ergot, eserine, fool's parsley, foxglove (*see* digitalis), Glauber's salts, 442
Poisoning and poisons—*continued*
  by hellebore, hemlock, horse-radish, hydrochloric acid, hydrocyanic acid, 443
  by iodoform, iron salts, laburnum, lathyrism, lead salts, Lysol (*see* carbolic acid), male fern, meadow saffron (*see* colchicum), mercurialis (dog's mercury), milk weeds, moulds, mustard, nicotine, nitric acid, 444
  by nux vomica, œnanthe crocata, oleander, opium, oxalic acid, phosphorus, physostigmine (*see* eserine), pilocarpine, poppies (wild), 445
  by potash (caustic), potatoes, prussic acid (*see* hydrocyanic acid), ptomaines, radish (*see* mustard poisoning), ranunculus, rape-seed cake (*see* mustard poisoning), rhododendron, 446
  by rye grass, saltpetre, santonin, savin, silver salts, 447
  by strychnine (*see* nux vomica), sulphur, sulphuric acid, tartar emetic (*see* antimony), tobacco (*see* nicotine), turpentine, veratrine, vetches, wormwood oil, yew, zinc salts, 448
Poll evil. *See* Fistula, Poll, 176
Post-partum hæmorrhage, 449
Post-partum paralysis, 449
Prickly heat, 450
Prolapse. *See* Uterus, Prolapse, 584
Prostate, diseases of, 451
  hypertrophy, 451
  inflammation, 451
  malignant growth, 451
Pruritus, 451
Psammoma, 452
Ptyalism, 453
Puerperal sepsis, 453
  curative treatment, 453
    drug therapy, 454
    serum therapy, 454
    vaccine therapy, 454
  prophylaxis, 454
Pumiced sole, 455
Puncture, 455
  abdomen. *See* Paracentesis, Abdominal, 341
  bladder, 455
  bowel, 456
  chest. *See* Paracentesis, Thoracic, 342
  heart sac. *See* Paracentesis, Pericardial, 342
  rumen, 457
  spinal membranes. *See* Lumbar Puncture, 268

Purpura hæmorrhagica, 457
Pyometra, 458

Q

Quarter evil. *See* Black-quarter, 49
Quidding, 459, 542
Quittor, operations for, 459

R

Rachitis. *See* Bone, Diseases of, 59
Ranula, 462
Rectum, diseases of, 462
    atresia of. *See* Anal Atresia, 34
    dilatation, 462
    impaction, 462
    inflammation, 463
    injuries, 463
    paralysis, 463
    prolapse, 463
        operations for, 464
    stenosis, 467
    tumours, 467
Redwater (*see also* Piroplasmosis, 346), 467
    curative and prophylactic treatment, 468
    diet, 468
Retention (urine), 469
Reticulitis, 469
Retropharyngeal abscess, 469
Rheumatism, 470
    acute form of articular, 470
        of muscular, 471
    chronic form of articular, 471
        of muscular, 472
Rigor, 472
Rinderpest, or cattle plague, 473
Ringbone, 474
Ringworm, 475
Roaring in horses, 476
Rumen, diseases of, 478
    dilatation, 478
    foreign bodies, 479, 482
    impaction, 479
    rumenitis, 480
    tapping. *See* Puncture of Rumen, 457
    tympanites, 481
        acute, 481
        chronic, 482
Rumenotomy, 482
Rumination, suspended, 484
Rupture, 485
    of flexor metatarsi, 485
        tendons, 485
    of suspensory ligament, 485
    of tendon of Achilles, 486

S

Saddle galls. *See* Galls, 198
Sandcrack, 486
Sarcocele, 488
Scab. *See* Parasitic Diseases, 379
Scalds. *See* Burns, 68
Scarification, 488
Schirrous cord, 489
Scurvy, 489
Seedy toe, 490
Septicæmia and pyæmia, 490
    diet in, 491
    drug therapy in, 490
    sero-vaccine therapy in, 491
Sero-vaccine therapy, 492
    active immunization, 493
    axioms to be observed in vaccine therapy, 497
    detoxicated vaccines, 494
    dosage, 495
    effects of vaccine inoculation, 495
    passive immunization, 492
    scope of vaccine therapy, 496
    sensitized vaccines, 494
Sesamoiditis, 497
Setons, 498
Sexual impulse, 500
    diminished, 500
    excessive. *See* Nymphomania, 327
Sheath, 501
    inflammation, 501
    œdema, 501
    tumours, 501
Shivering, 501
Shock. *See* Collapse, 99
Shoulder slip, 502
Sidebones, 502
Sinus, facial (paranasal), 503, 562
Snake bite, 503
Snake and viper bite, 505
Snuffles, 506
    cat, 506
    pig, 507
    vaccine therapy, 506
Sole bruising, 507
Sore shins, 507
Sorghum poisoning, 508
South African horse sickness, 508
Spasm, 509
    diaphragm, 509
    muscles, 510
Spasmodic colic. *See* Colic, 97
Spavin. *See* Bone Spavin, 60
Spaying. *See* Ovariotomy, 337
Speedy cut, 510
Spermatic cord, 510
    inflammation of, 510
Spinal cord, diseases of, 511
    compression, 511

Spinal cord, diseases of—*continued*
  concussion, 511
  inflammation, 511
Spirochætosis of fowls, 512
Splints, 512
Sprains, 513
  articular, 514
  ligamentous, 513
  muscular, 514
  tendinous, 513
Staggers, 515
  mad, 515
  sleepy, 516
  stomach, 516
Sterility, 516
  in female, 517
  in male, 516
Stiff sickness, 518
Stomach tube, its technique and uses, 519
Stomatitis, 525
  catarrhal, 525
  fungoid, 525
  pustular, 525
  ulcerative, 526
  vesicular, 526
Strabismus, 526
Strangles, 527
  drug therapy, 527
  prophylaxis, 528
  sero-vaccine therapy, 528
Stringhalt, 529
Stuttgart disease, 529
  diet in, 531
  drug therapy in, 530
  vaccine therapy in, 531
Suffocation, 532
Sunstroke, 533
Superpurgation, 533
Suppression (urine), 533
Surra (camel), 534
Sweating, excessive, 536
Swine erysipelas, 536
Swine fever, 537
Syncope, 537
Synovitis, 537
  acute, 537
  chronic, 538

T

Takosis, 538
  prophylaxis, 538
  vaccination, 538
Teeth, 538
  extraction, 638
  irregularities, 542
  tartar, 543
Tendinitis. *See* Sprains, 513
Tenotomy, 544
Tetanus, 547
  action of antitoxin, 548
  dosage of serum, 550
  general treatment, 550
  mode of administering serum, 549
Tetany, 551
Thoroughpin, 551
Thrush, 552
Ticks, 553
Tonsillitis, 555
Trachea, diseases of, 555
  stenosis, 555
  tracheitis, 555
Tracheotomy, 556
  operation, 556
  sequelæ, 559
Treads, coronet, 559
Trephining, 559
  frontal sinuses, 560
  nasal sinus, 562
  post-operative treatment, 563
  superior maxillary sinus, 561
Trypanosomiasis, 564
  classification, prevention, and treatment, 565
Tsetse flies, 567
Tuberculin, 568
  cutaneous method, 570
  intradermal method, 570
  ophthalmic method, 569
  subcutaneous method, 568
Tuberculosis, 570
  curative treatment, 572
  prophylactic treatment, 571
Tumours, 574
Turbinated bones, diseases of, 576
Tympany, bowel, 98
  rumen, 481-482

U

Ulceration (stomach), 576
Ulcers, 576
  callous, 577
  constitutional, 577
  inflamed, 578
Umbilical cord, diseases of, 578
  hæmorrhage, 560
  inflammation, 578
    curative and prophylactic treatment, 579
  œdema, 580
Umbilical hernia. *See* Hernia, 224
Urachus, pervious, 580
Uræmia, 580
Urethritis, 581
Urine, 581
  colour of, 582
  microscopical examination of, 582
  reaction of, 582

Urine—*continued*
  specific gravity of, 582
  tests for albumen and sugar, 583
Uterine torsion. *See* Dystocia, 137
Uterus, prolapse of, 584

V

Vaccines. *See* Sero-vaccine Therapy, 492
Vaginitis, 586
  gangrenous, 587
  infectious, granular, 586
  vesicular, 588
Variola, 588
  equina, 588
  vaccina, 589
Ventral hernia. *See* Hernia, 225
Vertigo. *See* Megrims, 306
Vesical calculi. *See* Calculi, 74
Vesication (*see also* Blistering, 54), 590
  action of blisters, 590
  counter-irritants, kinds of, 592
  prescriptions for blisters, 592
Vitamins, 593
  fat soluble A, 594
  water soluble B, 594
      C, 594
Vulvitis, 594

W

Warbles. *See* Parasitic Diseases, 412
Whistling, 594
White heifer's disease, 595
White scour, 596
  prophylaxis, 597
  treatment for, 596
Whitlow, 597
Wind galls, 598
Wind-sucking. *See* Crib-biting, 107
Wooden tongue. *See* Actinomycosis, 10
Wool-eating, sheep, 598
Worms. *See* Parasites 315
Wounds, 598
  biological therapy, 614
  chemical therapy, 608
  contused, 599
  drainage, 614
  healing of, 600
  incised, 599
  infection, 601
  lacerated, 599
  organisms present in wound infection, 606
  punctured, 599
  surgical therapy, 612
  therapy, general, 605
    special, 608

X

X Rays, 617

Y

Yoke gall, 617

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